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Global Set of Climate Change Statistics and Indicators

Implementation
Guidelines



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Global Set of Climate Change Statistics and Indicators

Implementation Guidelines



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Department of Economic and Social Affairs

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Comprising five chapters, illustrated and complemented by informative links and country examples, the present Guidelines are available on the Statistics Division website in a user-friendly format. Responsibility for the final version of the Implementation Guidelines, including any errors or omissions, rests with the Statistics Division. It is the Division's sincere hope that the guidance provided in this publication will be useful and contribute to developing and securing robust environment and climate change statistics programmes at the national level, to be used for compiling and disseminating trusted statistics and indicators.

The Statistics Division looks forward to continuous collaboration and support from members of the Expert Group on Environment Statistics and the wider statistical community in keeping the Implementation Guidelines updated, bearing in mind the evolving nature of the subject.

Abbreviations and acronyms

ASEAN	Association of Southeast Asian Nations
BR	biennial report
BSES	Basic Set of Environment Statistics
BTR	biennial transparency report
BUR	biennial update report
CISAT	Climate Change Statistics and Indicators Self-Assessment Tool
ECE	Economic Commission for Europe
ECLAC	Economic Commission for Latin America and the Caribbean
ESCAP	Economic and Social Commission for Asia and the Pacific
ESSAT	Environment Statistics Self-Assessment Tool
FDES	Framework for the Development of Environment Statistics
GHG	greenhouse gas
IMF	International Monetary Fund
INEGI	National Institute of Statistics and Geography
IPCC	Intergovernmental Panel on Climate Change
IRES	International Recommendations for Energy Statistics
MRV	measurement, reporting and verification
NAP	national adaptation plan
NC	national communication
NSDS	national strategy for the development of statistics
NSO	national statistical office
PARIS21	Partnership in Statistics for Development in the 21st Century
SDG	Sustainable Development Goal
SEEA	System of Environmental-Economic Accounting
SEEA-CF	System of Environmental-Economic Accounting Central Framework
SEEA-EA	System of Environmental-Economic Accounting Ecosystem Accounting
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFCCC-NFP	national focal point to UNFCCC
UNSD	Statistics Division of the United Nations

Chapter I

Introduction

1. The present Guidelines are intended to support countries in implementing the Global Set of Climate Change Statistics and Indicators¹ (hereinafter referred to as the “Global Set”), developed by the Statistics Division in close collaboration with the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC secretariat) and the Expert Group on Environment Statistics.² The Statistical Commission, at its fifty-third session, in 2022, adopted the Global Set as the framework for climate change statistics and indicators to be used by countries when preparing their own sets.³ The Global Set, which is comparable to the Basic Set of Environment Statistics in the Framework for the Development of Environment Statistics (FDES 2013),⁴ provides a statistical framework which is comprehensive, but not exhaustive, and designed to support countries according to their individual needs, concerns, priorities and resources.

2. The Guidelines will aid in the development of a national programme for the regular production of climate change statistics and indicators. They focus on institutional aspects designed to enable the relevant stakeholders to engage in active participation and contribution; to identify statistics and indicators relevant to national circumstances; to undertake the stepwise collection of data; and to prepare recommendations for regular publications and data dissemination.

3. The Guidelines are related to training materials produced by the UNFCCC secretariat.⁵ Other guidelines and materials that may also be consulted include the Implementation Guidelines for the Conference of European Statisticians’ Set of Core Climate Change-related Indicators and Statistics Using the System of Environmental-Economic Accounting,⁶ the Disaster-related Statistics Framework of the Economic and Social Commission for Asia and the Pacific (ESCAP),⁷ and training materials of the Statistical Institute for Asia and the Pacific.⁸ Highlights of these guidelines and materials are presented below:

- The training materials of the UNFCCC secretariat facilitate the preparation of reports by parties for submissions pursuant to the Framework Convention on Climate Change. These reports include national communications, biennial update reports, biennial transparency reports and others. Most of these reports undergo a review or technical analysis. For example, the biennial update reports are technically analysed as part of the process of international consultations and analysis under the Convention (<https://unfccc.int/ICA>), which identifies capacity-building needs. In many countries, national statistical offices are involved in the preparation of these reports. Where this is not the case, the national statistical offices should consult these reports to understand how climate change indicators may have been developed in the country and are used in its reports pursuant to the Framework Convention on Climate Change, including the source of data. Moreover, full reference should be made to the modalities, procedures and guidelines for the transparency framework for action and support referred to in article 13 of the Paris Agreement on climate

¹ Available at <https://unstats.un.org/unsd/envstats/climatechange.cshhtml>.

² United Nations, Statistics Division, “Expert Group on Environment Statistics”. Available at https://unstats.un.org/unsd/envstats/fdes/fdes_eges.cshhtml.

³ See E/2022/24.

⁴ United Nations, Statistics Division, *Framework for the Development of Environment Statistics (FDES 2013)* (New York, 2017). Available at <https://unstats.un.org/unsd/envstats/fdes.cshhtml>.

⁵ UNFCCC, “Modalities, procedures and guidelines for the transparency framework for action and support referred to in article 13 of the Paris Agreement” (decisions 18/CMA.1 and 5/CMA.3), available at <https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-serving-as-the-meeting-of-the-parties-to-the-paris-agreement-cma;“CGE training materials for the preparation of national communications from non-Annex I Parties”>, available at <https://unfccc.int/process-and-meetings/bodies/constituted-bodies/consultative-group-of-experts/cge-training-materials-for-the-preparation-of-national-communications>.

⁶ ECE, *Implementation Guidelines for the Conference of European Statisticians’ Set of Core Climate Change-related Indicators and Statistics using the System of Environmental-Economic Accounting* (Geneva, 2021). Available at <https://unece.org/statistics/publications/implementation-guidelines-CES-core-set-CCRSI>.

⁷ ESCAP, *Disaster-related Statistics Framework* (Bangkok, 2018). ESCAP/CST/2018/CRP.2.

⁸ ESCAP Statistical Institute for Asia and the Pacific, “Compiling climate change indicators: an accounting approach” (2023). Available at www.unsiap.or.jp/on_line/Guideline/2023/2023_1_CIM.pdf; e-Learning course available at <https://siap-elearning.org/login/index.php>.

⁹ United Nations, Statistics Division, “Global consultation on climate change statistics and indicators”. Available at https://unstats.un.org/unsd/envstats/ClimateChange_globalconsultation.cshhtml.

¹⁰ IPCC, *Climate Change 2021: The Physical Science Basis – Working Group I Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, United Kingdom, and New York, Cambridge University Press, 2021). Available at https://report.ipcc.ch/ar6/wg1/IPCC_AR6_WGI_FullReport.pdf.

change, in which emphasis is placed on capacity-building for data collection, scope, frequency and level of detail of reporting.

- The Economic Commission for Europe (ECE) Implementation Guidelines cited above provide practical information on how to implement the core set of climate change-related indicators of the Conference of European Statisticians. The indicator set provides the foundation for developing national sets of climate change-related indicators intended to show the big picture of climate change-related issues, address the most relevant current policy questions and meet information requirements. It includes 44 indicators, covering climate change drivers, emissions, climate change impacts, mitigation and adaptation. It also proposes corresponding contextual and operational indicators, which help in interpreting the core set in the national and global context and provide more detail according to national circumstances and priorities.
- ESCAP prepared the Disaster-related Statistics Framework based on the Sendai Framework for Disaster Risk Reduction 2015–2030, which represents a new global consensus on core concepts and targets and overall statistical requirements for disaster risk reduction. Disaster-related statistics include, but are not limited to, statistics about disaster occurrences and their impacts. Disaster-related statistics also include statistical information used for risk assessment and post-disaster impact assessments, which rely on analyses of a variety of sources of data on the population, society and economy, such as censuses, surveys and other instruments used in official statistics for multiple purposes.
- The Statistical Institute for Asia and the Pacific offers an e-learning course for compiling climate change indicators: an accounting approach. This course focuses on climate change indicators that can be compiled from environmental-economic accounts. The topics covered include climate change policies and indicators; and energy and air emission accounts.

4. The present Implementation Guidelines were developed taking into account the results of the global consultation⁹ on the draft Global Set carried out between May and September 2021, additional work done in various countries, and the guidelines and materials mentioned in the paragraphs above.

1.1. Background

5. Climate change is a major threat facing humanity. It affects all countries and disrupts national economies and the well-being of communities. According to Working Group I of the Intergovernmental Panel on Climate Change (IPCC),¹⁰ human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels. These have a probable range of 0.8°C–1.2°C. Global warming is expected to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate with all the related consequences. The Paris Agreement, a legally binding international treaty on climate change, was adopted by 196 parties at the twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, held in Paris on 12 December 2015, and entered into force on 4 November 2016. It aims to limit global warming to well below 2°C, preferably to 1.5°C, relative to pre-industrial levels. While the modalities, procedures and guidelines for the transparency framework for action and support referred to in article 13 of the Paris Agreement were established and adopted in 2018, there was no underlying framework linking the reporting requirements arising from the Paris Agreement and the statistics or indicators needed to support climate policy action.

6. Following the Statistical Commission's decisions at its forty-seventh¹¹ and forty-ninth¹² sessions (2016 and 2018, respectively), the Statistics Division developed the Global Set, in collaboration with the UNFCCC secretariat, to promote the policy and statistics interface. The Global Set thus serves as the statistical framework for monitoring and reporting climate action with suitable indicators to serve as guidance for countries to prepare their own sets. This statistical framework links the reporting requirements stemming from the Paris Agreement and the agreed modalities, procedures and guidelines for implementing the enhanced transparency framework to the indicators necessary to support climate action. In this way, the Global Set will support the implementation of the enhanced transparency framework and the global stocktake¹³ of the Paris Agreement, and also of the climate-related Sustainable Development Goal indicators.¹⁴

7. The development of the Global Set was completed in several stages. The Statistics Division first carried out a systematic review of climate change statistics and indicators from about 130 countries with representative regional coverage and identified a draft set of the most commonly repeated indicators. The draft was then submitted to a pilot survey in 2020, to which 13 international and regional organizations responded with thematic validation of most of the proposed indicators and 17 countries provided feedback on the applicability of those indicators. In early 2021, the Statistics Division, in collaboration with the UNFCCC secretariat and other international bodies, including the Expert Group on Environment Statistics, prepared a draft Global Set for a global consultation. The initial list of indicators was expanded and the statistics needed to compile indicators were also added.

8. The objectives of the 2021 global consultation were, first, to define a Global Set from proposed indicators based on relevance to countries; second, to consolidate available methodology for climate change statistics and indicators; third, to define the gaps in methodology and improvement needs; and fourth, to assess existing capacities to compile climate change statistics and indicators. The consultation was organized in two parts, tailored to collect the necessary information from countries and international and regional agencies. Where countries are concerned, part I made enquiries about the institutional dimensions of their preparedness to produce climate change statistics and indicators; for agencies, it made enquiries about their activities on data collection, methodology development and capacity development in the area of climate change statistics. Part II contained the draft Global Set and respondents were asked to provide comments on each individual indicator or statistic and on the corresponding metadata. For this part, countries were requested to assess the relevance, methodological soundness and data availability for each indicator or statistic, while agencies were asked to assess the indicators and the metadata in their respective areas of expertise.

9. The global consultation, to which 86 countries and 26 agencies responded (see figure 1), led to the definition of a Global Set of Climate Change Statistics and Indicators proposed according to their relevance for the countries. It also helped to consolidate the methodology; to identify the areas that needed improvement and the gaps contained in the methodology; and, lastly, to assess the existing capacities to compile statistics and indicators on climate change. The draft Global Set was consolidated and finalized based on the feedback from the global consultation, the review by the Expert Group on Environment Statistics at its eighth meeting and through bilateral consultations. The final Global Set was presented in the report of the Secretary-General on climate change statistics to the Statistical Commission at its fifty-third session,¹⁵ which is available in all the official languages of the United Nations, and the list of indicators is presented in annex II below. While the related statistics in the Global Set are not included in this annex, both the indicators and statistics are

¹¹ See E/2016/24.

¹² See E/2018/24.

¹³ UNFCCC, "Global stocktake". Available at <https://unfccc.int/topics/global-stocktake>.

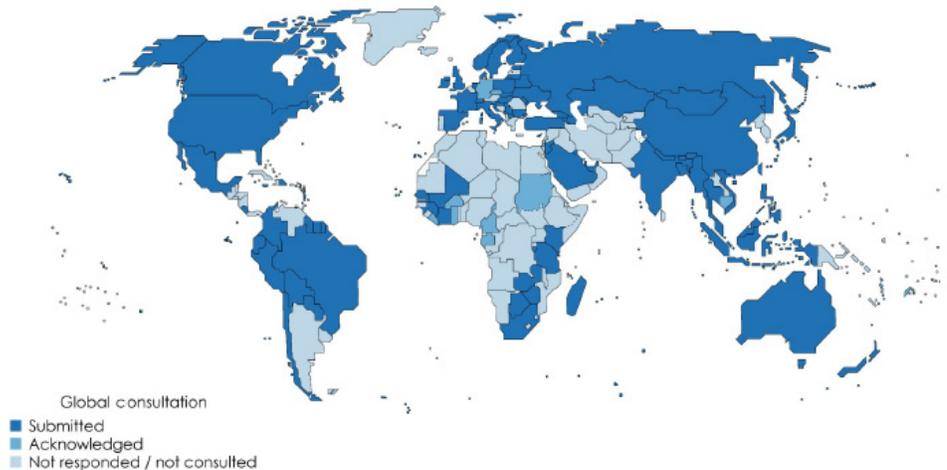
¹⁴ United Nations, Statistics Division, "SDG indicators: global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development". Available at <https://unstats.un.org/sdgs/indicators/indicators-list/>.

¹⁵ See E/CN.3/2022/17.

- ¹⁶ United Nations, Statistics Division, “Background document to the report of the Secretary-General on climate change statistics (E/CN.3/2022/17), Global Set and metadata”. Available at <https://unstats.un.org/unsd/statcom/53rd-session/documents/BG-3m-Globalsetandmetadata-E.pdf>.

presented in the background document to the report of the Secretary-General, entitled “Global Set and metadata”.¹⁶

Figure 1
Country and area submissions and acknowledgements to the global consultation on the draft Global Set of Climate Change Statistics and Indicators



Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

- ¹⁷ United Nations, Statistics Division, “Background document to the report of the Secretary-General on climate change statistics (E/CN.3/2022/17), global consultation on the Global Set”. Available at <https://unstats.un.org/unsd/statcom/53rd-session/documents/BG-3m-GlobalConsultationontheGlobalSet-E.pdf>.
- ¹⁸ The Statistics Division considers the high likelihood of a “non-response bias” influencing the results. That is to say, it is much more likely that the countries responding to the consultation were those with resources already devoted to climate change statistics. Although 68 countries offered a response, there were many which did not respond at all. The Statistics Division will continue to advocate attention to climate change statistics within national statistical offices and continue its outreach to all United Nations Member States on this issue.

1.2. Rationale for the Guidelines

10. The first part of the global consultation, to which 70 responses were received from 68 countries and 21 responses from 20 agencies,¹⁷ provided a representative volume of information, in particular on the capacity development and implementation support needs. The overall picture indicates that almost all countries have national policies on climate change, most have national strategies for the development of statistics and units working on climate change statistics within their national statistical offices, and fewer have specific strategies on climate change statistics.¹⁸ Findings also showed, however, that the capacity to produce statistics on climate change and to inform climate change policy is often absent or, in many cases, informal and of an ad hoc nature.

11. For many countries and areas, there is scope for increased engagement through formalized dialogue or a consultative process (for example, with a technical working committee, expert group or other such mechanism) that involves the national statistical office liaising more actively with line ministries and agencies. Furthermore, such a formal arrangement would preferably include a specific focus and agenda item on climate change and other issues beyond that, in line with the needs of the country, and on those themes within climate change that are of pressing demand (for example agriculture, disasters, greenhouse gas (GHG) emissions, sea level rise, among others). Invariably, owing to the broad scope of the issue of climate change, such a process requires statisticians to collaborate with experts in other fields relevant to the many themes which climate change encapsulates. The findings of the consultation indicated that many countries already have formal or informal dialogues or consultative processes as a matter of routine. This presents opportunities for capacity development initiatives involving agencies, countries and areas, along with the Statistics Division,

to call for more formalized dialogues and processes and to learn from and apply successful examples from specific countries.

12. The global consultation enquired about several aspects of the involvement of national statistical offices in reporting processes to the Framework Convention on Climate Change or contributions to policymaking in the area of climate change. Specifically, the consultation revealed that, out of 68 responses, 37 countries affirmed that, at the national level, the national statistical office is involved in the preparation of its GHG inventories. At the regional level, however, a small minority of countries in the Americas (3 out of 15 responses) demonstrated national statistical office involvement. Furthermore, three countries (Finland, Mauritius and Türkiye) responded that their national statistical office was responsible for compiling GHG inventories of the country (see subsection 4.1.4 below for further details).

13. A moderate number of countries (25 out of 64 responses) also affirmed the involvement of the national statistical office in the preparation of the new biennial transparency reports under the Paris Agreement. Many national statistical offices stated that they provided source data to line ministries that acted as the national focal point to UNFCCC (UNFCCC-NFP)¹⁹ for the compilation of GHG inventories and for the purpose of reporting to the Framework Convention. For the inventory of GHG emissions, such data primarily include sectors such as energy, transport, agriculture, waste, industry and others. Other data that are often provided for reporting to the Framework Convention include the areas of population, demography, housing, gross domestic product, poverty and unemployment. In some cases, national statistical offices are also involved in data compilation and validation, and in the preparation of the reports for the Framework Convention.

14. The national statistical offices that reported not being directly involved in the compilation of GHG inventories and reporting to the Framework Convention on Climate Change indicated that there was no legal or institutional mandate to collaborate; either there was no need for active involvement or participation took place on an ad hoc basis. Some countries pointed out, however, that even when the national statistical office was not directly involved in this process, it still contributed indirectly, since the UNFCCC-NFP would use the data that the national statistical office provided through its official publications and reports.

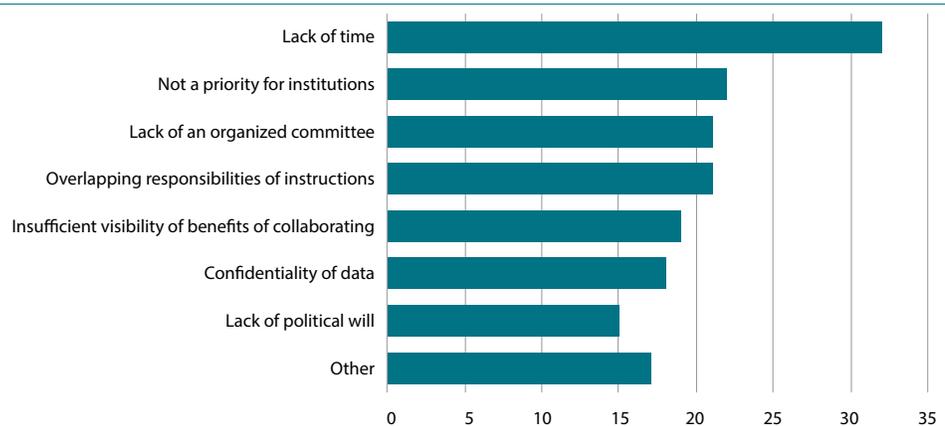
15. Effective mechanisms for national consultation and data exchange are a key requirement for enhancing the role of national statistical offices in the climate policy processes. In this regard, the consultation revealed that, in most (45 out of 68) countries, the national statistical office collaborates with the UNFCCC-NFP. The degree and nature of this collaboration varies greatly. Twelve responses identified the collaboration as “ad hoc”. In addition, national statistical offices are sometimes in charge of the quality, in addition to the validation, of the data. Other responses provided a range of information on the level of interaction with the UNFCCC-NFPs, observing that communication took place upon request but there was no formal relationship; there was consultation on sectoral data (including economic data; energy balance; agriculture and animal production data; infrastructure, transport and housing data; and so forth); in some countries there was a legal obligation; and in some countries UNFCCC-NFPs participated in meetings of technical committees.

16. In response to the specific question, “What are the main barriers to collaboration among institutions for the production of climate change statistics?” most respondents cited “lack of time”. This response was followed by: “not a priority for institutions”,

¹⁹ UNFCCC, “National focal points”. Available at <https://unfccc.int/process/parties-non-party-stakeholders/parties/national-focal-point>.

while “lack of an organized committee” and “overlapping responsibilities of institutions” were the next most common reasons adduced (see figure 2).

Figure 2
Main barriers to collaboration among institutions for the production of climate change statistics



Source: United Nations, Statistics Division, “Background document to the report of the Secretary-General on climate change statistics (E/CN.3/2022/17), global consultation on the Global Set”. Available at <https://unstats.un.org/unsd/statcom/53rd-session/documents/BG-3m-GlobalConsultationontheGlobalSet-E.pdf>.

17. Lastly, a question on the most important needs to enable a country to develop climate change statistics identified the following needs:

- Capacity-building for the collection of climate change-related data
- Capacity-building for reporting on climate change
- Climate change surveys
- Coordination across the many institutions and organizations compiling data and reporting statistics and information
- Coordination among the different producers
- Development of metadata and indicators for climate change statistics
- Additional staff in the environment-related divisions of the national statistical office
- Resources (capital) for statistics on climate change adaptation and mitigation processes
- Study to establish baseline values for prioritized climate change indicators
- Support tools in indigenous languages, community engagement platforms and technical training workshops
- Workshops, conferences and meetings with experts.

18. The above results clearly demonstrate the need for implementation support tools and continuous capacity development in the field of climate change statistics. In the future, as more and more countries embark upon further compilation and dissemination of climate change-related outputs (statistics, indicators, compendiums and other such products), a clearly defined Global Set which has undergone a rigorous consultation process at the international level will serve as a tool to improve the compilation of climate change statistics by countries, equipping countries to meet their reporting

obligations to the Framework Convention on Climate Change, and facilitating international comparison across countries on the issue of climate change.

1.3. Aims and objectives

19. The Guidelines aim to assist countries in improving their monitoring of climate change and its impacts and their response actions by better informing the UNFCCC-NFPs about the benefits of official statistics and by guiding the national statistical offices in strengthening their engagement in the area of climate change. The Guidelines refer to the relevant frameworks, methods, guidelines, handbooks and other materials which will facilitate closer engagement on both sides. They specify the key steps needed to set up national processes to produce climate change statistics in response to national policies, while striving to improve the comparability of data at the international level. This process will also strengthen the links between statistics and policymaking, and thus contribute to improved monitoring of the evolution of climate change and the way in which countries progress towards its mitigation and adapt to its adverse effects.

20. Taking into account the difficulties that national statistical offices and UNFCCC-NFPs may face while compiling climate change statistics, the overall objectives of the Guidelines are:

- To help countries to set up the national consultation processes which can embrace this multidisciplinary statistical work in a manner complementary to their current and future reporting to the Framework Convention on Climate Change
- To deepen countries' self-assessment activities using the Global Set
- To provide a basis for countries to initiate the development of a national programme for sustained production of climate change statistics within their national statistical system.

21. The Guidelines are meant to be used for national consultation and the data-sharing processes needed to enable national statistical offices, UNFCCC-NFPs and key stakeholders in their coordination, data compilation and dissemination of official climate change statistics.

1.4. How to use the Guidelines

22. The Guidelines recommend a hands-on, stepwise approach and references to relevant materials and further information to enable the establishment of a sustainable programme on climate change statistics and indicators. This will help countries to produce and disseminate relevant, accurate, timely, accessible, coherent, comparable and reliable statistics, to monitor and support reporting on climate change. Other guidelines, such as the ECE Implementation Guidelines for the Conference of European Statisticians' set of core climate change-related indicators and statistics using the System of Environmental-Economic Accounting (SEEA) and the decisions of the Conferences of the Parties to the Framework Convention on Climate Change and the Paris Agreement²⁰ may also be consulted during the process.

23. The Guidelines provide systematic instructions for defining the scope and relevance of nationally needed indicators, setting up the institutional arrangements, selecting statistics and indicators from the Global Set, assessing the available and necessary capacities, and other processes to bridge the gap between policy and statistics in the area of climate change. The statistics and indicators will be used for the national and international monitoring of climate policies and reporting on thematic areas and topics such as climate change mitigation and adaptation, biodiversity, the oceans, land degradation, disaster risk reduction and others.

²⁰ UNFCCC, "Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement". Available at <https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-serving-as-the-meeting-of-the-parties-to-the-paris-agreement-cma>.

Chapter 2

Understanding climate change

24. According to the United Nations Framework Convention on Climate Change, climate change is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is additional to natural climate variability observed over comparable time periods.²¹ In short, climate change is the long-term change in observed weather patterns over long periods of time in any particular location or over the entire globe.

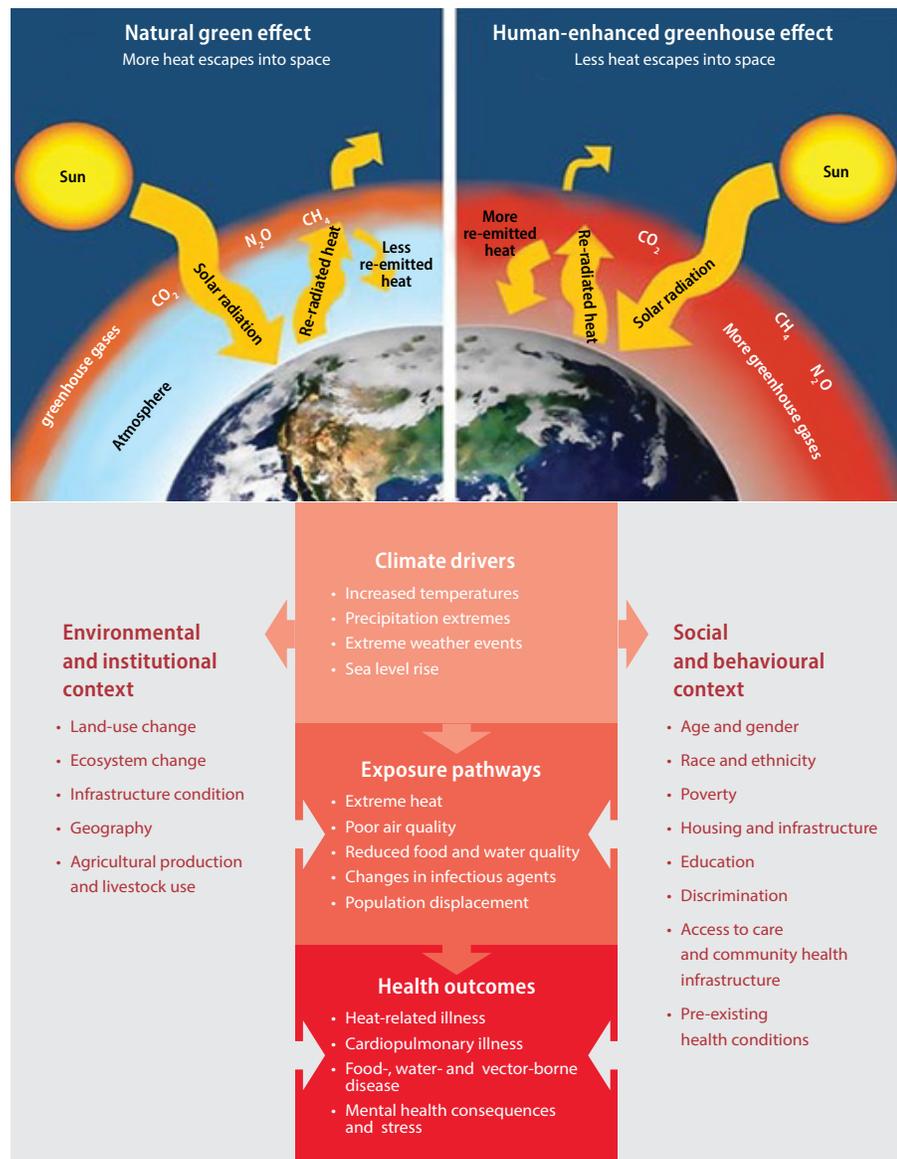
²¹ See United Nations, *Treaty Series*, vol. 1771, No. 30822.

25. Global warming is a direct consequence of a changing climate. This warming occurs as a consequence of several factors. Some of the key essential elements in understanding climate change are provided below and in figure 3:

- GHGs occur naturally, but their concentration in the atmosphere has increased and continues to increase as a result of human activities, most of all, the use of fossil fuels.
- GHGs include carbon dioxide (CO₂), methane (CH₄), nitrous oxides (N₂O) and others, including what are known as the fluorinated gases (F gases).
- These GHGs, in the upper atmosphere, act as a blanket that protects the planet by keeping a suitable temperature for life to be sustained.
- Since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil and gas.
- Clearing land and forests can also release CO₂. Landfills for waste are a major source of CH₄ emissions. Energy, industry, transport, buildings, agriculture and land use are among the main emitters of GHGs.
- Climate change can affect human health, the ability to grow food, housing, safety and work.
- Some communities are already more vulnerable to climate impacts, such as people living in small island States and other developing countries.
- Conditions such as sea level rise and saltwater intrusion have advanced to the point where entire communities have had to relocate, and protracted droughts are putting people at risk of famine. In the future, the number of so-called “climate refugees” is expected to rise.
- Switching energy systems from fossil fuels to such renewables as solar or wind power will reduce the emissions driving climate change.
- Adapting to climate consequences protects people, homes, businesses, livelihoods, infrastructure and natural ecosystems.
- Adaptation will be required everywhere but must be prioritized now for the most vulnerable people who have the fewest resources to cope with climate hazards. The rate of return can be high. Early warning systems for disasters, for instance, save lives and property, and can deliver benefits worth up to 10 times the initial cost.

26. Figure 3 illustrates the causes of climate change and its impacts. The exposure pathways exist within the context of other factors that positively or negatively influence health outcomes (see the boxes labelled “Environmental and institutional context” and “Social and behavioural context”). Key factors that influence the vulnerability of individuals are shown in the box on the right and include social determinants of health and behavioural choices. Key factors that influence vulnerability on larger scales, such as natural and built environments, governance and management, and institutions, are shown in the box on the left. All these influencing factors can affect an individual’s or a community’s vulnerability through changes in exposure, sensitivity and adaptive capacity and may also be affected by climate change.

Figure 3
Understanding climate change processes



Sources: Adapted from Land Trust Alliance, “Conservation in a changing climate: how does the greenhouse effect work?” (Washington, D.C., 2021); M.C. Sarofim and others, “Temperature-related death and illness”, in *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (Washington, D.C., U.S. Global Change Research Program, 2016).

Chapter 3

Global Set of Climate Change Statistics and Indicators

27. The Global Set is a comprehensive statistical framework, with statistics, indicators and metadata, designed to support countries in preparing their own sets of climate change statistics and indicators according to their individual concerns, priorities and resources. It will assist countries embarking on the development of climate change statistics programmes by providing the scope and coverage on what may be considered relevant to climate change. It can also assist countries already involved in this area of statistics by providing a reference list.

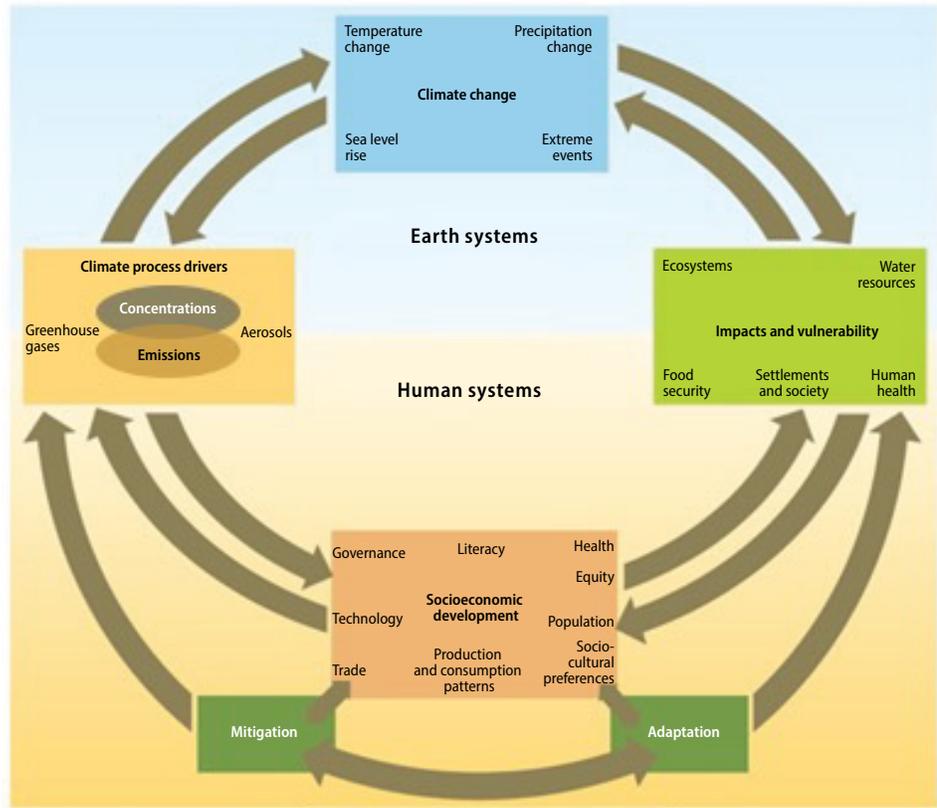
28. To provide flexibility, the indicators are formulated in the simplest possible way, so that they can be easily applied or adapted to national circumstances. In addition, a tiered system was set up in a way that distinguishes the most commonly applied indicators (tier 1) from those that are less often applied (tier 2) and those that require substantial methodological development to become operational (tier 3). The tiered system of the Global Set follows the same structure and logic applied for the Sustainable Development Goal indicators and the FDES 2013 Basic Set of Environment Statistics (see below under metadata definitions of the tiers). The Global Set tiered system differs from the tiered system applied in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories,²² where a tier represents a level of methodological complexity, with tier 1 representing the basic method, tier 2 an intermediate level and tier 3 the most demanding in terms of complexity and data requirements. The Global Set takes into consideration the diversity of all Member States of the United Nations at varying stages of development and with different geographical characteristics. It includes both the indicators addressing climate change and the underlying statistics needed for their compilation, whenever distinct guidance for these statistics was identified.

29. Short metadata sheets were completed to the extent possible for all the indicators and statistics in the Global Set, ensuring that internationally agreed statistical definitions are applied for the indicators and statistics assessed at tiers 1 and 2. There are some gaps in the metadata, in particular for the indicators assessed at tier 3. The metadata were thoroughly revised following the global consultation, the review during the eighth meeting of the Expert Group on Environment Statistics and bilateral consultations with specialized bodies (see sect. III of the report of the Secretary-General on climate change statistics to the Statistical Commission at its fifty-third session). The details for each metadata field are presented below and cover most of the recommendations put forward during the above-mentioned reviews.

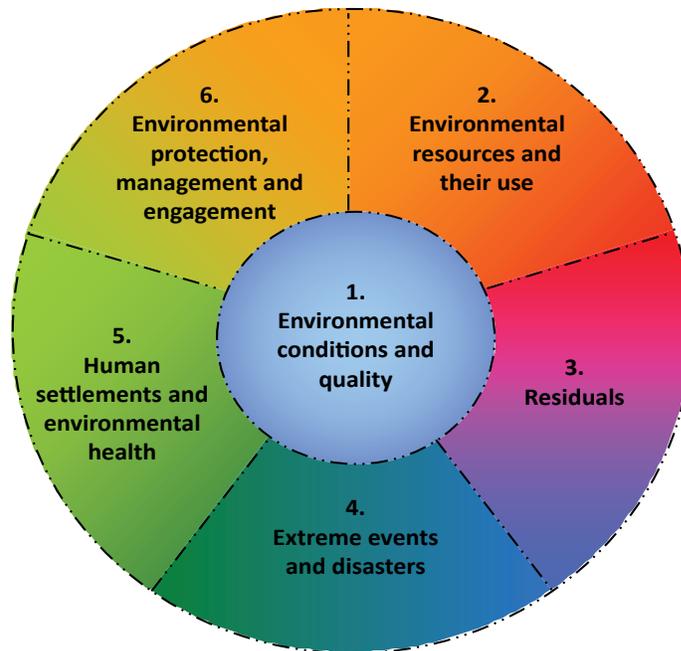
30. The scope of the Global Set covers the climate change aspects defined by the five policy areas of IPCC, namely drivers, impacts, vulnerability, mitigation and adaptation. Its structure is based on those five areas and FDES 2013, as illustrated in figures 4 and 5.

²² See IPCC, "Introduction to the 2006 Guidelines", in *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (2006), p. 1.6. Available at www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_1_Ch1_Introduction.pdf.

Figure 4
Methodological foundations of the Global Set

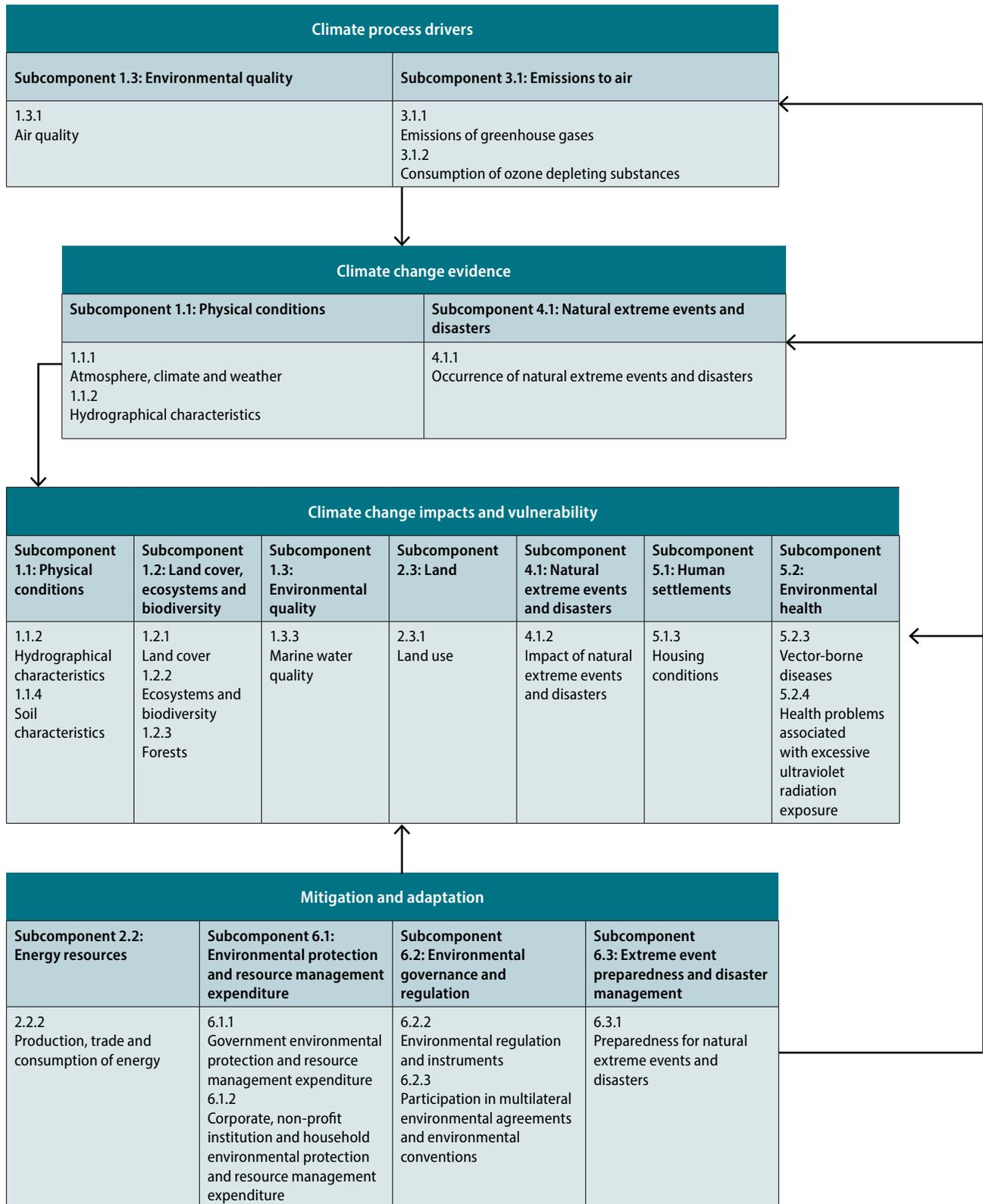


IPCC, Fourth Assessment Report (2007)



Framework for the Development of Environment Statistics (FDES 2013)

Figure 5
Illustration of climate change topics in chapter 5 of FDES 2013



31. The Global Set includes primarily the biophysical indicators and statistics, but also human activities, and social and institutional aspects related to climate change. The links between policy and statistics are articulated according to the relevant articles of the Paris Agreement and the subsequent decisions of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement (indicated as “CMA” in the decision number), along with related Sustainable Development Goals and Sendai Framework indicators.

32. The five policy areas of IPCC are broken down into 34 topics. In each area, the most important indicators used to describe the topics are listed, thus providing guidance to countries developing national climate change statistics programmes in a comprehensive and balanced manner. Also included are statistics for which distinct methodology was identified. Thus, the Global Set contains 158 indicators and 190 statistics. The purpose of this structure is to ensure balanced coverage of indicators and statistics, and to provide direction to policies (for example, on drivers, mitigation, adaptation and other issues). In addition, the structure is designed to help countries to select and prioritize the statistics and indicators most relevant to their national context.

33. The metadata for each indicator and statistic include the following details described in different fields:

- **Indicator:** As defined in FDES 2013 (p. 7): “Environmental indicators are used to synthesize and present complex environment and other statistics in a simple, direct, clear and relevant way ... may take various forms such as rates, ratios or proportions, and be constructed at different levels of aggregation”. The indicators serve to support developing and monitoring of national climate policies and international reporting requirements, in particular those under the Paris Agreement.
- **Statistic:** As defined in FDES 2013 (p. 7): “Environment statistics are environmental data that have been structured, synthesized and aggregated according to statistical methods, standards and procedures”. The statistics serve three main purposes: first, to provide less complex options for countries with less developed statistical systems to initiate climate monitoring through official statistics; second, to provide statistics needed to compile the indicators (for tiers 1 and 2); and third, to provide inputs to further define and develop the tier 3 indicators. Statistics were not introduced for indicators where the indicator and statistic are identical (9 cases, denoted with “Equivalent to the indicator” in the metadata sheets); and the statistics and their metadata are fully described within the cited methodological source, for example, often from Sustainable Development Goal and Sendai Framework indicators (21 cases, denoted with “Refer to original source in metadata” in the metadata sheets).
- **Area:** A schematic framework developed by IPCC summarizes the complexity of climate change as a sequence of events: drivers, impacts, vulnerability, mitigation and adaptation. These events are applied as five top-level areas in the Global Set. Each indicator is assigned to one of the five IPCC areas as a primary belonging, while some indicators have also been assigned as applicable in one or more additional areas.
- **Topic:** As explained in FDES 2013 (p. 3), the statistical topics represent the quantifiable aspects of the areas taking into account the data types and sources of the statistics needed to describe them.

- **Theme:** Generic keywords are applied to identify the indicators and provide ease of search and navigation. Themes were introduced to help with navigation throughout the 158 indicators and 190 statistics.
 - **Paris Agreement article:** There is correspondence between the indicator or statistic and the articles in the Paris Agreement specifying the reporting requirements.
 - **Paris Agreement work programme-Katowice package:** There is correspondence between the indicator or statistic and the decisions from the Paris Agreement work programme, adopted in Katowice,²³ specifying the reporting requirements under the modalities, procedures and guidelines for the enhanced transparency framework.
 - **FDES 2013:** There is correspondence between the statistics and FDES 2013 (codes from FDES 2013 are included). If the match is not verbatim, this is indicated with the words “similar to” in square brackets. In several cases the proposed climate-relevant statistic is actually a part of the FDES 2013 statistic (to be derived from a classification), which is indicated as “part of” in square brackets.
 - **Sustainable Development Goals:** There is correspondence between the indicator and the Sustainable Development Goal indicators (Sustainable Development Goal indicator codes are included). If the match is not verbatim, this is indicated with the words “similar to” in square brackets. In several cases, the relation to the Sustainable Development Goal indicator is partial (in other words, only some definitions or other metadata details apply), which is indicated as “related to” in square brackets.
 - **Sendai Framework:** There is correspondence between the indicators and the Sendai Framework indicators.
 - **Tier:** This is defined by considering the relevance (to climate change), methodological soundness and data availability. While the relevance or connection to climate change varies per indicator, a certain relation to climate change has been identified for all the indicators included in the Global Set. Tier 1 indicators and statistics are shown in bold; tier 2 in normal text; tier 3 in italics. The tiers were defined as follows:
 - Tier 1 indicators are relevant, methodologically sound, and those for which more than 50 per cent of the countries that responded to the global consultation indicated that data are available. This rule was not applied to the Sustainable Development Goal indicators included in the Global Set, however, and here the original Sustainable Development Goal indicator tiers are used.²⁴
 - Tier 2 indicators are relevant, methodologically sound, and those for which fewer than 50 per cent of the countries that responded to the global consultation indicated that country data are available. This rule was not applied to the Sustainable Development Goal indicators included in the Global Set, however, and here the original Sustainable Development Goal indicator tiers are used.²⁵
 - Tier 3 indicators are relevant, but not methodologically sound, and country data may not be available.
 - **Definition:** Short definitions derived primarily from international statistical guidance are included. Following the definition, its source is specified in square brackets. Where the original definition is modified or adapted, this is indicated with the words “adapted from”. While definitions are included for all indicators and statistics, only those in tiers 1 and 2 are sourced from international statistical guidance (with some exceptions, such as in the areas of meteorology,
- ²³ Further details of the reporting requirements were specified in decision 5/CMA.3 of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement.
- ²⁴ The Sustainable Development Goal indicator tiers are those as of January 2022, just prior to the adoption of the Global Set in March 2022. It should be noted that the tiers of a number of these indicators have been revised since that time. The current tier classification for Sustainable Development Goal indicators may be consulted at <https://unstats.un.org/sdgs/iaeg-sdgs/tier-classification/>.
- ²⁵ Ibid.

biodiversity or other thematic areas where the methods are sufficiently robust even if not a subject of official statistics). For tier 3 indicators and statistics, the definitions are often from non-statistical sources, defined in an expert way or insufficiently defined.

- **Relevance:** This explains the relation of the indicators to the overall climate change aspects, sourced mostly from IPCC assessments.
- **National data sources:** This indicates the likely national institutions (such as the national statistical offices, line ministries and administrations) which may be producing relevant data or data products, including statistics, indicators and accounts.
- **Type of data source:** This illustrates the nature of data collection according to one of the six categories specified in FDES 2013 (p. 12). These categories are:
 - Censuses
 - Sample surveys
 - Administrative records
 - Remote sensing and thematic mapping
 - Monitoring systems
 - Scientific research and special projects.

Another category was added: “Inventory” (not in FDES 2013), applicable to GHG emissions and forest-related indicators and statistics.

- **Periodicity:** This indicates how often the indicator or statistic is updated (annually, biennially, or every three, five or ten years).
- **Category of measurement:** This indicates the generalized units used to report the indicator or statistic (area, length, mass, volume, and others).
- **Computation and compilation methods:** These introduce concise information, such as formulae for compiling the indicators or how the statistics are produced from raw data. This field however could not be populated for all the indicators at this stage.
- **International primary data reference:** This specifies which international institutions collect data from countries on the suggested indicator or statistic.
- **International primary data reference, description:** This provides a description of the data collection (data path or code).
- **International primary data reference, URL:** This provides the uniform resource locator (URL) where the data can be accessed.
- **Type:** This follows the Sustainable Development Goal descriptions of data type and indicates whether the data were produced by countries (C), are country-adjusted data (CA), estimated data (E), global monitoring data (G), modelled data (M), non-relevant (N) or not available (NA).
- **International secondary data references:** These list international organizations which disseminate the data sourced from the primary data reference.
- **Other data reference:** These include data on the indicator or statistic which may be produced following the same or similar methodology (definition), but not at the country level (may be globally or regionally modelled).
- **Potential aggregation and scales:** These are the suggested levels of reporting and aggregation items which make it possible to report the indicator with appropriate detail.

- **Methodological guidance:** This includes links to the relevant internationally applicable and official sources for tier 1 and 2 indicators. For tier 3 indicators, this field also includes non-statistical references. If the match with Sustainable Development Goal and ECE indicators is not verbatim, this is indicated with the words “similar to” in square brackets. In several cases the relation to the Sustainable Development Goal or ECE indicator is partial (in other words, only some definitions or other metadata details apply); this is indicated as “related to” in square brackets.
34. Metadata details regarding national data sources, periodicity, category of measurement, and potential aggregations and scales are introduced for tiers 1 and 2 indicators and statistics but not usually for tier 3, given the lack of statistical guidance. Methodological guidance references and further reading are provided for all indicators and statistics. At present, the Global Set statistics and indicators at tiers 1 and 2, which primarily include the relevant indicators from the Sustainable Development Goals, Sendai Framework and GHG inventories, are internationally comparable. About a third of the indicators and statistics are at tier 3, however, suggesting that it may be difficult to compare one country’s monitoring and reporting of climate impacts, mitigation and adaptation progress to another’s, and the widespread application of the Global Set will help to resolve this issue.
35. The Global Set in its most detailed form, including the metadata, is presented in part II of the Climate Change Statistics and Indicators Self-Assessment Tool (CISAT), details of which may be found below, in subsection 4.2.1. The tool itself may be downloaded from <https://unstats.un.org/unsd/envstats/climate%20change/cisat.cshtml>. The main structure of the Global Set, setting out the various areas, topics, indicators, statistics, tiers, references to Paris Agreement articles and the Paris Agreement work programme-Katowice package, is presented in annex II. As recommended by the Statistical Commission at its fifty-third session, updates to the methodology, including tiers, will be reviewed by the Expert Group on Environment Statistics and presented to the Commission before the revision of the Global Set.²⁶
36. The following is a brief indication of the main statistical methods employed to define the statistics and indicators in the Global Set:
- **IPCC:** the Intergovernmental Panel on Climate Change 2006 Guidelines²⁷ (6 indicators and 4 statistics follow IPCC)
 - **FDES 2013:** the Framework for the Development of Environment Statistics and its Manual on the Basic Set of Environment Statistics (BSES)²⁸ (10 indicators and 110 statistics follow FDES 2013, either verbatim, or in “similar to” or “related to” form)
 - **Sustainable Development Goals:** Sustainable Development Goal indicators metadata²⁹ (43 indicators and 8 statistics match Sustainable Development Goal indicators either verbatim, or in a “similar to” or “related to” form)
 - **Sendai:** the Sendai Framework for Disaster Risk Reduction 2015–2030³⁰ (9 indicators and 3 statistics follow Sendai guidance)
 - **ECE:** Conference of European Statisticians set of core climate change-related indicators metadata³¹ (25 indicators and 10 statistics match ECE indicators either verbatim, or in a “similar to” or “related to” form)
 - **IRES:** International Recommendations for Energy Statistics³² (7 indicators and 17 statistics follow IRES)
 - **SEEA-CF:** the System of Environmental-Economic Accounting Central Framework³³ (10 indicators and 13 statistics follow SEEA-CF)
- ²⁶ See E/2022/24, decision 53/116 on climate change statistics.
- ²⁷ IPCC, “Introduction to the 2006 Guidelines”, in *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (2006). Available at www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_1_Ch1_Introduction.pdf.
- ²⁸ United Nations, Statistics Division, *Framework for the Development of Environment Statistics (FDES 2013)* (New York, 2017). Available at <https://unstats.un.org/unsd/envstats/fdes.cshtml>.
- ²⁹ United Nations, Statistics Division, “SDG indicators metadata repository”. Available at <https://unstats.un.org/sdgs/metadata>.
- ³⁰ United Nations, *Sendai Framework for Disaster Risk Reduction 2015–2030* (Geneva: UNISDR, 2015). Available at www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030.
- ³¹ ECE, “CES set of core climate change-related indicators and statistics using the System of Environmental-Economic Accounting (Version 2.0)” (2021). Available at <https://statswiki.unece.org/pages/viewpage.action?pagelid=285216611>.
- ³² United Nations, Statistics Division, *International Recommendations for Energy Statistics (IRES)* (New York, 2018). Available at <https://unstats.un.org/unsd/energystats/methodology/documents/IRES-web.pdf>.
- ³³ United Nations and others, *System of Environmental-Economic Accounting 2012: Central Framework* (New York, 2014). Available at <https://seea.un.org/content/seea-central-framework>.

- ³⁴ United Nations and others, "System of Environmental-Economic Accounting – Ecosystem Accounting". White cover publication, pre-edited text subject to official editing (2021). Available at <https://seea.un.org/ecosystem-accounting>.
- ³⁵ IPCC, *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Geneva, IPCC, 2008). Available at www.ipcc.ch/site/assets/uploads/2018/02/ar4_syr_full_report.pdf.
- ³⁶ IPCC, "Annex I: Glossary", in *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty* (Cambridge, United Kingdom, and New York: Cambridge University Press, 2018). Available at www.ipcc.ch/site/assets/uploads/sites/2/2022/06/SR15_AnnexI.pdf.
- **SEEA-EA:** the System of Environmental-Economic Accounting Ecosystem Accounting³⁴ (8 indicators and 15 statistics follow SEEA-EA).
37. Brief descriptions of the five IPCC climate change areas: drivers, impacts, vulnerability, mitigation and adaptation, and also a list of topics under each area, are included below:
- **Drivers of climate change:** these are changes in the atmospheric concentrations of GHGs and aerosols, land cover and solar radiation that alter the energy balance of the climate system.³⁵ The area includes 26 indicators, grouped in seven topics and the indicators in this area are of higher relevance for the highly industrialized countries. The main sources of data at the national level are the GHG inventory institutions, national statistical offices, institutions responsible for energy, finance, forestry, agriculture and land statistics. The main types of data sources include GHG and forestry inventories, population and household censuses, administrative data, remote sensing and thematic mapping and monitoring data.
The following topics are included:
 - Total GHG emissions
 - Atmospheric concentration of GHGs
 - Energy production, supply and consumption
 - Fossil fuels
 - Population
 - Transport
 - Land and agriculture.
 - **Impacts:** these are the consequences of realized risks on natural and human systems, in cases where risks result from the interactions of climate-related hazards (including extreme weather and climate events), exposure, and vulnerability. Impacts generally refer to effects on lives, livelihoods, health and well-being, ecosystems and species, economic, social and cultural assets, services (including ecosystem services), and infrastructure. As stated in the glossary to the IPCC special report on global warming, "impacts may be referred to as consequences or outcomes, and can be adverse or beneficial".³⁶ The area includes 54 indicators, grouped in 12 topics. While the indicators in this area are of high relevance to all countries, they are of greatest relevance to small island developing States, developing countries and least developed countries. This area contains the broadest spectrum of themes addressed in the Global Set, hence there will be a more diverse range of national institutions involved in the processes of data collection and compilation of the indicators. The main sources of data at the national level are institutions responsible for disasters, agriculture, forestry, meteorology, oceanography, water, health, biodiversity, fisheries, tourism and transport statistics, among other domains. The main types of data sources include forestry inventories, monitoring systems, remote sensing and thematic mapping, administrative records, and surveys.
The following topics are included:
 - Agricultural production affected by climate change
 - Areas affected by climate change

- Freshwater resources
- Hazardous events and disasters
- Climate change and human health
- Climate change evidence
- Soil condition
- Distribution and status of species
- Distribution and status of ecosystems
- Production and consumption of materials
- Climate change impacts on transport and critical infrastructure
- Climate change impacts on tourism.
- **Vulnerability:** this is the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. As defined in the IPCC Third Assessment Report, “Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity”.³⁷ The area includes 28 indicators, grouped in five topics. The indicators in this area are of higher relevance for small island developing States, developing and least developed countries. As indicated by the number of indicators at tier 3, this area is less statistically mature and requires substantial methodological development. The main sources of data at the national level are the institutions responsible for health, food, biodiversity, forestry, disasters and agriculture statistics, among others. Data produced by the national statistical office are also required for the compilation of a number of indicators, in particular those addressing the vulnerable population in the country. The main types of data sources include forestry and biomass inventories, population and household censuses, administrative data, remote sensing and thematic mapping and monitoring data.

The following topics are included:

- Water security, food security and agriculture
- Vulnerable species, ecosystems and their services
- Buildings and infrastructure vulnerable to climate change
- Vulnerable population
- Area of country vulnerable to climate change.
- **Mitigation (of climate change):** this is “a human intervention to reduce emissions or enhance the sinks of greenhouse gases”. Note that this encompasses carbon dioxide removal options (glossary to the IPCC special report on global warming). The area includes 18 indicators, grouped in three topics. The indicators in this area are of higher relevance for the developed and highly industrialized countries, and also for countries with large land and forest areas. The main sources of data at the national level are the GHG and forestry inventory institutions, national statistical offices, and institutions responsible for energy, finance, transport statistics, among others. The main types of data sources include GHG and forestry inventories, administrative data, remote sensing and thematic mapping and monitoring systems.

The following topics are included:

- Renewable energy
- Climate change mitigation policies, strategies and plans
- Climate change mitigation technology and practice.

³⁷ IPCC, *Climate Change 2001: Synthesis Report*. Available at www.ipcc.ch/site/assets/uploads/2018/05/SYR_TAR_full_report.pdf.

- **Adaptation:** “In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects” (glossary to the IPCC special report on global warming). The area includes 32 indicators, grouped in seven topics. The indicators in this area are of higher relevance for small island developing States, developing countries and least developed countries. Most of the indicators are at tier 3, hence this area is less statistically mature and requires substantial methodological development. The main sources of data at the national level are institutions responsible for labour, finance, disasters, education, biodiversity, water, forestry and agriculture statistics, among others. National statistical offices also have more extensive roles to play with data provision in this area. Some of the types of data sources include population and household censuses, surveys, administrative records and remote sensing and thematic mapping. As most of the indicators are at tier 3, however, further sources will be identified in the future.

The following topics are included:

- Climate change adaptation policies, strategies and plans
- Risk management, disaster forecasting and early warning systems
- Public awareness of and education on climate change
- Area-based adaptation to climate change
- Climate change monitoring
- Water management
- Waste management.

Chapter 4

Developing a national programme of climate change statistics

38. The main purpose of developing a national programme of climate change statistics is to ensure that the high-quality, transparent and sustained production of such statistics is set in place. This will be achieved, by way of inclusion in the national statistical system, for all the statistics needed to monitor climate change and its impacts and support the implementation of mitigation and adaptation actions. To that end, various topics of social, economic and environmental domains will be linked under the umbrella of climate change statistics. Thus, the national programme of climate change statistics will support the monitoring of national climate policies and actions, as defined in the nationally determined contributions and national action plans, and will contribute to improved international comparability of the climate policy achievements.

4.1. Role of national statistical offices, national focal points and key stakeholders

4.1.1. Role of national statistical offices

39. The key role of national statistical offices is to lead the processes of expanding and consolidating the national statistical system to include climate change statistics, which includes stipulating what constitutes official statistics, as well as applying criteria and standards for the compilation, validation and dissemination of official climate statistics. These processes can be expected to face challenges in novel statistical areas, such as environment and climate change statistics. Accordingly, continuous assessment, learning and exchanging of good practices will be necessary.

40. The main vehicle used to transform unofficial and alternative data and statistics into official statistics is the Fundamental Principles of Official Statistics. A summary of the Principles may be found in the Handbook on Management and Organization of National Statistical Systems,³⁸ as adapted and set out below.³⁹ Further explanations regarding their applicability in the area of climate change have been added where relevant.

Principle 1 states that official statistics are to be compiled and made available by official statistical agencies to honour citizens' entitlement to public information with data about the economic, demographic, social and environmental situation. Climate change is a cross-cutting theme across these domains.

Principle 2 states that statistical agencies need to determine their methods and procedures according to strictly professional considerations, including scientific principles and professional ethics. Scientific uncertainties, the need for scenarios and the very critical importance of climate change make this area particularly dynamic with many ongoing developments.

³⁸ United Nations, Statistics Division, *Handbook on Management and Organization of National Statistical Systems*, 4th ed., Handbook of Statistical Organization (New York, 2022). Available at <https://unstats.un.org/capacity-development/handbook/index.cshml>.

³⁹ The text is adapted from the *Handbook on Management and Organization of National Statistical Systems*; the original text of the Fundamental Principles may be found in General Assembly resolution 68/261 of 29 January 2014, entitled "Fundamental Principles of Official Statistics".

Principle 3 requires statistical agencies to present their information according to scientific standards on the sources, methods, and procedures of the statistics.

Principle 4 states that statistical agencies are entitled to comment on erroneous interpretation and misuse of statistics.

Principle 5 indicates that data for statistical purposes may be drawn from all types of sources, be they surveys or administrative records. Climate change is an area of statistics that is particularly dependent on alternative, big data and other novel data sources, which presents certain challenges to ascertaining the quality of official statistics.

Principle 6 prescribes the obligation to respect statistical confidentiality.

Principle 7 states that the laws, regulations and measures under which the statistical systems operate are to be made public.

Principle 8 spells out that coordination among statistical agencies within countries is essential.

Principle 9 recommends the use of international concepts, classifications and methods by statistical agencies in each country.

Principle 10 recommends bilateral and multilateral cooperation in statistics as that contributes to improving systems of official statistics in all countries.

4.1.2. Role of national focal points

41. Countries are requested to report regularly to the Framework Convention on Climate Change, through their UNFCCC-NFP,⁴⁰ which is usually the ministry responsible for the environment, climate or foreign affairs, about their plans to achieve their climate policy objectives through national policies and measures.

42. Thus, the policies or strategies on climate change should be aimed at:

- Promoting appropriate national measures to reduce the country's degree of vulnerability due to climate change
- Improving communities' adaptation to climate change or ability to mitigate the impact of climate change
- Contributing effectively to the reduction of GHG emissions
- Developing behaviours that contribute to the fight against climate change at all levels
- Improving the reporting of all information related to climate change based on existing modalities, procedures and guidelines and using the necessary reporting tools
- Setting up a national measurement, reporting and verification (MRV) and enhanced transparency framework system. The enhanced transparency framework under the Paris Agreement is substituted for the MRV system under the Framework Convention on Climate Change and the Kyoto Protocol.

4.1.3. Role of other key stakeholders

43. Other key stakeholders include the data producers from various departments of ministries and national agencies. National stakeholders could be government entities, parastatals, private sector bodies, academic institutes, research organizations, non-governmental organizations and other relevant bodies, as deemed appropriate for the country. These stakeholders may need training on the various frameworks and tools applied in official statistics and further guidance to engage in the production of climate change statistics.

⁴⁰ The UNFCCC secretariat has developed a network of UNFCCC-NFPs for activities pertaining to the Convention, the Kyoto Protocol and the Paris Agreement. More information on UNFCCC-NFPs is available at <https://unfccc.int/process/parties-non-party-stakeholders/parties/national-focal-point>.

4.1.4. Collaboration between the national statistical office, national focal point and key stakeholders

44. The global consultation and various experiences shared by countries at meetings of the Expert Group on Environment Statistics,⁴¹ the ECE expert forums for producers and users of climate change-related statistics⁴² and other events reveal that the collaboration among national statistical offices and UNFCCC-NFPs⁴³ requires strengthening in most countries. That said, however, national statistical offices are increasingly involved in the national climate policymaking and reporting processes, including the compilation of GHG inventories.

45. Until the current time, the key role of national statistical offices has consisted mainly in assessing data needs and gaps and promoting the benefits of applying official statistics in those areas which are currently subject to issues such as of public trust, transparency and quality.

46. The UNFCCC-NFPs will need to understand how to benefit from collaborating with the national statistical offices, in particular in the areas of assessing impacts, vulnerability and adaptation to climate change, since many of the indicators in these areas require social, economic, demographic and other data produced traditionally by national statistical offices.

47. The strengthened collaboration between national statistical offices, UNFCCC-NFPs and key stakeholders will be reflected in a more operational MRV and enhanced transparency framework system in the country.

48. National examples of how some national statistical offices are involved in climate change-related activities may be seen in the boxes below.

⁴¹ United Nations, Statistics Division, "Expert Group on Environment Statistics". Available at https://unstats.un.org/unsd/envstats/fdes/fdes_eges.cshtml.

⁴² ECE, "Meetings on climate change-related statistics". Available at <https://unece.org/statistics/climate-change/meetings>.

⁴³ UNFCCC, "National focal points". Available at <https://unfccc.int/process/parties-non-party-stakeholders/parties-national-focal-point>.

Box 1

Development of climate change statistics in Armenia

In 2020, the Armenian road map for the development of climate change-related statistics was developed with the support of the ECE Statistical Division and is available at www.armstat.am/file/doc/99525613.pdf. It was the first study conducted in Armenia in an endeavour to assess the current status of the country's climate change-related statistical system. The priorities and actions for the development of such a system has become a reference tool for future climate change policy development. Since 2021, representatives from the Statistical Committee of the Republic of Armenia (Armstat) have been involved in working groups of four target areas of global issues related to climate change, namely climate change mitigation, adaptation, financing and increasing the effectiveness of international cooperation. Coordination of these working groups is conducted by the Ministry of Environment.

In the framework of the United Nations Development Programme (UNDP)-Global Environment Facility project on building the Armenian national transparency framework under the Paris Agreement, a one-day workshop was held on the problems of accessibility and quality assurance of the statistical data for the country's climate change national report. At the workshop, discussions were organized among stakeholders and expert communities on necessary indicators for the fulfilment by Armenia of its obligation to submit national reports under the Framework Convention on Climate Change, on the compilation of a list of indicators that needed to be improved and on the framework of work to be conducted in the future. The Global Set was translated into Armenian and delivered by Armstat and the project.

Source: Statistical Committee of the Republic of Armenia, www.armstat.am.

Box 2**Environment Statistics and Climate Change Unit of Statistics Mauritius**

Statistics Mauritius falls under the aegis of the Ministry of Finance, Economic Planning and Development. It is the depository of all official statistics produced in the country and, as such, collects, compiles, analyses and disseminates statistics and related information on the social, demographic, economic and financial activities in Mauritius to serve the needs of public and private users. In 2012, Statistics Mauritius graduated to the IMF Special Data Dissemination Standard.

- The Statistics Mauritius Code of Practice for Official Statistics is based on the values of the United Nations Fundamental Principles of Official Statistics and the African Charter on Statistics. The law governing Statistics Mauritius compels public sector agencies, enterprises and households, and the public at large to provide data for statistical purposes at the request of statistical authorities.
- Upon requests by certain government ministries to meet their reporting needs and to provide statistical inputs for ongoing policy and decision-making processes, officers from Statistics Mauritius are deployed in statistical units established within the line ministries, directly servicing the respective institutions in all statistical matters.
- These in-house statistical units get involved in many of the ministries' funded activities, comprising training, workshops, projects and other exercises, including logistic considerations such as office space, desks, computers and, in some cases, even staffing, in particular the provision of support staff. The remuneration of the statistical staff remains the responsibility of the national statistical office, however.
- Special projects such as the nationally appropriate mitigation actions and the capacity-building initiative for transparency implemented by the Ministry of Environment, Solid Waste Management and Climate Change are funded from the Global Environment Facility, which includes the hiring of consultants, project managers and coordinators, workshops, capacity-building and training, stakeholders' meetings and equipment. The Environment Statistics and Climate Change Unit of Statistics Mauritius assists the Ministry by providing statistical inputs.
- The Environment Statistics and Climate Change Unit disseminates data through the following publications:
 - Digest of Environment Statistics: an annual publication based on FDES 2013, which brings together in a single volume all data pertaining to the environment.
 - Economic and Social Indicator (ESI), Environment Statistics: an annual publication designed to rapidly disseminate the main environmental statistical data pending the publication of the detailed digest or reports.
 - Historical series of environment statistics, which are uploaded annually on the website of Statistics Mauritius after the release of the Digest of Environment Statistics. These contain statistics dating back to 1993 and cover areas such as temperature, hours of sunshine, GHG emissions, treatment of wastewater, disposal of solid waste and forest areas.
 - Ad hoc reports, such as the water account for the years 2013, 2015 and 2018 and environmental economic accounts for the year 2012.

Most of the Statistics Mauritius publications are accessible on its website at: <https://statsmauritius.govmu.org>. Apart from these publications, the Environment Statistics and Climate Change Unit also responds to requests for information from international organizations, national organizations (both public and private), academia and the public in general.

Source: Statistics Mauritius, <https://statsmauritius.govmu.org/SitePages/Index.aspx>.

Box 3

Greenhouse gas and inventory reporting by Statistics Finland

Regular compilation and dissemination of the full Global Set at the national level require significant resources and continuous cooperation of several organizations producing data, statistics and information. In Finland, the tasks of the national statistical office, Statistics Finland (www.stat.fi/index_en.html), are to compile statistics and reports on social conditions and to coordinate and develop the national statistical system with other government officials. According to the Climate Act,* Statistics Finland is also the national entity with overall responsibility for the GHG emissions inventory and reporting (<https://stat.fi/en/statistics/khki>). Statistics Finland compiles the national communications and biennial reports under the Framework Convention on Climate Change, which describe the impacts of climate change, policies and measures on mitigation and adaptation, and progress towards fulfilling mitigation commitments. In addition, information analysed by the Ministry for Foreign Affairs in support of efforts by developing countries to mitigate climate change and adapt to its impacts forms an important part of these reports. The country's financial contribution to the operating entities of the financial mechanism of the Framework Convention on Climate Change, and also the support that it provides through bilateral, regional and other multilateral channels, are reported together with information on support provided for technology transfer and capacity-building. Other tasks of the GHG inventory unit at Statistics Finland include expert support for decision makers in issues related to emissions and removals, and production of information to support planning mitigation measures and monitoring their results.

Assigning responsibility for the GHG inventory to the national statistical office in Finland has the following beneficial outcomes:

- Production of emission estimates for the energy and industrial processes in-house
- Close cooperation with energy statistics experts in-house
- Consultation possibilities with environmental accounts and waste statistics in-house
- Access to data collected for administrative purposes, such as different registries and monitoring data for environmental permits, such access being ensured by the Statistics Act
- Existing procedures for confidential information and release of statistics
- Established cooperation with the compiler organizations of GHG inventory estimates for sectors other than energy and industrial processes, cooperation strengthened by regularly updated agreements between the organizations in question and Statistics Finland
- Independent and permanent position of a national statistical office, rendering access to data easier and ensuring reliable archiving of data
- Established cooperation with the expert organizations and relevant ministries.

Statistics Finland is responsible for compilation of the Sustainable Development Goal indicators, requiring cooperation with the various organizations that provide the necessary data and statistics. In addition, regular production and development of economic and social statistics, statistics on emissions, energy statistics and environmental accounts in Statistics Finland offer a solid basis of data, expertise and networks for compilation of broad indicator sets such as the Global Set. Consolidating a large amount of information on drivers, emissions, impacts, mitigation and adaptation related to climate change in a single, accessible data set would allow several potential uses for the set, such as planning and monitoring the national energy and climate strategy, and numerous other strategies and programmes.

Box 3 (continued)

The global consultation on the draft Global Set in Finland was coordinated by Statistics Finland in 2021. Significant inputs to the consultation were provided by the Natural Resources Institute Finland (www.luke.fi/en/statistics), the Finnish Environment Institute (www.syke.fi/en-US), the Finnish Institute for Health and Welfare (<https://thl.fi/en/web/thlfi-en/statistics-and-data>), the Finnish Meteorological Institute (<https://en.ilmatieteenlaitos.fi/>), the Ministry of Agriculture and Forestry (<https://mmm.fi/en/frontpage>), the Ministry of Foreign Affairs (<https://um.fi/climate-smart-foreign-policy>), the Ministry of Economic Affairs and Employment (<https://tem.fi/en/energy-and-climate-strategy>) and the Ministry of the Interior (<https://intermin.fi/en/frontpage>). These organizations would be the main players in compilation of the Finnish application of the Global Set. At present these organizations have no funds devoted or targeted specifically towards the compilation of the Global Set, and agreements on funding and cooperation for the compilation would be needed. Although some data are available for two thirds of the variables relevant for Finland, the continuity of data collection and cooperation needs to be ensured, together with adequate resources. Regular implementation and compilation of the Global Set would require that the work be included in short-term and mid-term plans of the organizations involved. Planning of dissemination and promoting further use of the Global Set are also important to ensure that full advantages of the Global Set would be reached.

Source: Statistics Finland, www.stat.fi/index_en.html.

* See <https://ym.fi/en/the-reform-of-the-climate-change-act>; www.tilastokeskus.fi/meta/lait/2013_tilastolaki_en.pdf.

Box 4

Coordination of greenhouse gas inventory by the Turkish Statistical Institute

Türkiye ratified the Paris Agreement in October 2021, declaring that it would implement the Paris Agreement as a developing country and in the scope of its nationally determined contribution statements, provided that the Agreement and its mechanisms did not prejudice its right to economic and social development. Since 2006, the GHG inventory of Türkiye has been prepared and submitted annually to the Framework Convention on Climate Change by 15 April of each year, in accordance with the revised “Guidelines for the preparation of national communications by parties included in annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”. The annual inventory submission consists of the national inventory report and the common reporting format tables. The latest national inventory report contains estimates of national GHG emissions and removals for the period 1990–2020 and is available at: <https://unfccc.int/documents/461926>.

As a national statistical office, the Turkish Statistical Institute (TurkStat) is the agency responsible for compiling the national GHG inventory, which is prepared by a GHG emissions inventory working group set up under the Coordination Board on Climate Change in Türkiye. In addition, TurkStat is responsible for the coordination of this working group and was designated as the national inventory focal point of Türkiye by a decision taken by the Coordination Board in 2009. The Board is currently known as the Coordination Board on Climate Change and Adaptation and preparations are under way for a comprehensive climate law which will also reconfigure the working groups established previously.

Preparation of the inventory is the joint responsibility of the Greenhouse Gas Emissions Inventory Working Group, which consists of the following institutions: TurkStat, Ministry

of Energy and Natural Resources, Ministry of Transport and Infrastructure, Ministry of Environment, Urbanization and Climate Change, and Ministry of Agriculture and Forestry. TurkStat is also assigned the responsibility for compiling the GHG emissions statistics, which provide the basis for the national GHG inventory under the Official Statistics Programme. The Official Statistics Programme, based on the Turkish Statistics Law No. 5429, is prepared for a five-year period in order to determine the basic principles and standards dealing with the production and dissemination of official statistics and to produce the reliable, timely, transparent and impartial data required at national and international level. Climate change statistics and indicators are already included as a new topic in the latest Official Statistics Programme for the 2022–2026 period and preparations are under way for future work in this regard, also coordinated by TurkStat.

Source: Turkish Statistical Institute, www.tuik.gov.tr/Home/Index.

4.2. Assessment and implementation of the Global Set

4.2.1. Assessment of available and needed resources

49. It is recommended that national statistical offices, in close collaboration with the UNFCCC-NFPs, organize and initiate the assessment of available and needed resources using CISAT.⁴⁴ The tool gives United Nations Member States an opportunity to undertake a thorough and detailed assessment of the statistics and indicators in the Global Set, which will enable the country to prioritize the nationally relevant indicators and statistics. The tool is structured in a package similar to the FDES 2013 Environment Statistics Self-Assessment Tool (ESSAT).⁴⁵ Accordingly, the tool consists of two parts, along with accompanying metadata of the Global Set.

50. Part I of CISAT focuses on the overall institutional and organizational structure of national statistics in the country and on specific information regarding climate change statistics in terms of, among other issues, policy frameworks, mandates, institutional set-up, organization, collaboration, resources, international cooperation and uses. Accordingly, part I contains information of interest from a managerial and policy perspective and includes the following sections and questions:

A. Identification of institutions

- A1. Name and title of person and institution responsible for the completion of the self-assessment.
- A2. Additional collaborating persons and institution(s)?

B. National policies/strategies

- B1. Are there national policies or strategies related to climate change in place?
- B2. Is there a national statistical plan/programme/strategy in place (e.g., national strategy for the development of statistics (NSDS))?
- B3. Is climate change statistics included in the national statistical plan/programme/strategy?
- B4. Is there a national climate change statistics plan/programme/strategy in place?

⁴⁴ Available at <https://unstats.un.org/unsd/envstats/climatechange/cisat.cshtml>.

⁴⁵ Available at <https://unstats.un.org/unsd/envstats/fdes/essat.cshtml>.

C. Mandate and organization of climate change statistics

C1. Is there an institution with a legal mandate to produce or to coordinate climate change statistics?

C2. Is there a department, division or unit responsible for climate change statistics in the national statistical office (NSO)?

C3. What is the status of the climate change statistics department, division or unit in the NSO?

C4. Are there national institutions (e.g., Ministry of Environment, Meteorological Office, Ministry of Water, etc.) that have responsibility to collect climate change statistics or information?

D. Production and reporting of climate change statistics

D1. Is the NSO currently involved in the preparation of the country's GHG inventory, as part of the reporting obligations of the UNFCCC and/or in the preparation of national reports to UNFCCC (e.g., national communications (NCs) and biennial reports (BRs) for Annex I Parties; and national communications (NCs) and biennial update reports (BURs) for non-Annex I Parties)?

D2. Will the NSO be involved in the preparation of the new biennial transparency reports (BTRs) under the Paris Agreement?

D3. Has the NSO received requests from GHG inventory compilers about specific data needs for inventory compilation that could NOT be met by NSOs (e.g., energy, industry, agriculture, transport, waste statistics)?

D4. What kind of adaptation related information/data/statistics have been provided, or are ready to be provided, by the NSO for use in preparing national reports (such as national adaptation plans (NAPs) under the UNFCCC or Adaptation Communications under the Paris Agreement)?

D5. Has the NSO developed any specialized climate change surveys, or modules in existing censuses/surveys?

D6. If yes, please list the names of these surveys and provide website links to the surveys and resulting reports.

D7. Has the NSO produced and disseminated climate change statistics either in hard copy, electronically or online?

D8. Has any other institution in the country produced and disseminated climate change statistics?

E. Inter-institutional collaboration

E1. Does the NSO currently collaborate with the national focal point(s) to the UNFCCC?

E2. Is there a committee, inter-institutional working group or task force⁴⁶ in place to coordinate the production of environment statistics?

E3. If yes, does it also include climate change statistics?

E4. Which institutions are members of the committee, inter-institutional group or task force?

E5. What are the main barriers to collaboration among institutions for the production of climate change statistics?

⁴⁶ A committee is understood as a longer-term establishment while a working group and task force may be convened on an ad hoc basis. While there is no agreed distinction between such establishments, they are likely to perform similar functions of inter-institutional collaboration for statistical purposes in a country.

F. Technical assistance and training

F1. Has the country requested technical assistance (e.g., short-term assistance, project proposals) or capacity development in the field of climate change statistics from organizations (e.g., UNSD, UN regional commissions, UNFCCC, UNDP, UNEP, World Bank, regional development banks, regional institutions, international development agencies, etc.) or countries?

F2. What kind of assistance has the country received from organizations or countries in terms of technical assistance and capacity development in the field of climate change statistics?

F3. Has the country provided technical assistance to other countries in the field of climate change statistics (e.g., short-term assistance, project proposals) or capacity development?

G. The way forward in climate change statistics

G1. In which areas are there plans to strengthen and develop climate change statistics programmes, units and/or activities in the country?

G2. What are the main vehicles through which the country requires technical assistance and capacity development in the field of climate change statistics?

G3. What are the most important needs for the country to develop climate change statistics?

51. Part II of CISAT is based on the Global Set and its metadata. It follows the hierarchical structure of the Global Set (in descending order: area, topic, indicator, statistic) and serves as a tool to assess the national relevance, importance, methodological soundness, data availability and sources of the individual statistics and indicators and so forth. It also helps to identify relevant quantitative and qualitative data gaps, and to develop a plan for filling them with a view to strengthening climate change statistics according to national priorities, needs and available resources.

52. The content of part II is more technical and specific to the field of climate change statistics and would require the involvement of a larger number of stakeholders. It is structured as a template which lists the indicators and statistics contained in the Global Set, followed by key policy and statistical references and a section on self-assessment. The following are included in the self-assessment section:

1. Relevance

To be relevant, it means that the indicator or statistic is needed to monitor climate change in the country, its drivers and impacts, and inform national climate change-related policies (mitigation or adaptation actions and measures). The relevance from an international point of view is explained in the metadata field called 'Relevance' in the Metadata Word file. It is recommended that after the NSO, UNFCCC-NFP and other key stakeholders examine and assess the relevance of the Global Set of Climate Change Statistics and Indicators, if the national priorities, concerns and resources require additional indicators and statistics, these should be inserted in additional rows under the appropriate area/topic structure. This will contribute to the establishment of a country's national set of climate change statistics and indicators.

1.1 Relevance/priority for climate change-related policies

In this context, relevance refers to the importance of the indicator and its statistics for national climate change concerns or policy considerations.

1.1.1 Relevance of indicator/statistic at the national level

1.1.2 Reference/link

1.1.3 Priority for national data collection

1.2 Requirements or user requests for this indicator/statistic

1.2.1 Subnational

1.2.2 National

1.2.3 Regional

1.2.4 International

1.2.5 Specification

2. Data/statistic/indicator characteristics

This section addresses characteristics of data, statistics and indicators such as availability, quality, dissemination formats, gaps, etc.

2.1 Data characteristics and availability

Are national data available and suitable for compiling the proposed statistic/indicator?

2.1.1 Data availability

2.1.2 Reference/link

2.1.3 Data type

2.1.4 Periodicity

2.1.5 Earliest year available

2.1.6 Latest year available

2.2 Institution(s) collecting data on this statistic/indicator

This sub-section specifies the institution responsible for collecting, processing and storing the data for the statistic/indicator (e.g., meteorological institution for weather data).

2.2.1 Collected by the national statistical office

2.2.2 Collected by Ministry of Environment or equivalent institution

2.2.3 Collected by Other (specify)

2.3 Format and characteristics of statistic/indicator

The compilation of climate change statistics and indicators may take place at the institutions collecting the respective data or may be done by other institutions.

2.3.1 Similarity of statistic/indicator at the national level to the international one

2.3.2 Format of statistic/indicator

2.4 Institution(s) compiling this statistic/indicator

This sub-section specifies the institution responsible for compiling, disseminating and reporting of the statistic/indicator.

- 2.4.1 Compiled by the national statistical office
- 2.4.2 Compiled by Ministry of Environment or equivalent institution
- 2.4.3 Compiled by Other (specify)

2.5 Main reasons why the statistic/indicator is not available or not updated

An indication of the main reasons why the statistic/indicator is not available or not updated should be provided.

- 2.5.1 Resource constraints
- 2.5.2 Methodological/technical difficulty in data collection
- 2.5.3 Insufficient quality
- 2.5.4 Inaccessibility
- 2.5.5 Lack of institutional set-up/coordination
- 2.5.6 Other (specify)

3. Methodological soundness

The soundness should be assessed by comparing the internationally recommended methods with the nationally applied ones. In case there is a difference between the international and national methods, an assessment of this difference will help the country to monitor its progress towards aligning with the internationally recommended methods, for example the IPCC 2006 Guidelines for GHG inventories. Short metadata sheets were completed to the extent possible for all the indicators and statistics in the Global Set, ensuring that internationally agreed statistical definitions are applied for the indicators and statistics assessed at Tier 1 and 2.

3.1 International comparability

Comparability entails use of common concepts, definitions and methods in production of climate change statistics and indicators across countries. It is an important dimension of quality and if data/statistics/indicators are not comparable, they lose a lot of their utility and relevance.

- 3.1.1 Methodology
- 3.1.2 Reference/link
- 3.1.3 Main reason why the methodology used is not sound

3.2 Methodology characteristics

Methods and standards agreed internationally, regionally and nationally are used with regard to definitions, units, variables and classifications.

- 3.2.1 Type of data source
- 3.2.2 Category of measurement
- 3.2.3 Unit of measurement
- 3.2.4 Potential aggregations and scales
- 3.2.5 Classifications/groupings

4. Future plans

This section may be used to provide comments on plans to improve the statistic/indicator in the future, e.g., via new data collection, improvement of existing methodologies, etc.

53. The completion of the self-assessment should be undertaken as part of a multi-stakeholder consultation and discussion process on the state of climate change statistics and indicators in the country. Such an initiative, while usually led by the national statistical office, should be carried out as a joint effort by all main relevant stakeholders that play an active role in the production, dissemination and use of climate change statistics and indicators. The Statistical Commission, at its forty-ninth session, reiterated the importance of enhancing collaboration between national statistical offices and national authorities responsible for reporting climate change-related information to the Framework Convention on Climate Change. National statistical offices are therefore encouraged to consult with both the country's UNFCCC-NFP, and also broadly with other relevant institutional stakeholders that may include line ministries (such as the Ministry of Environment, the Ministry of Agriculture, the Ministry of Energy and the Ministry of Water), representatives of academic institutions, non-governmental organizations and other bodies, to obtain the necessary information. Hence, it is desired that a unified understanding of a country's situation as it pertains to climate change statistics and indicators be realized by all relevant stakeholders working with this consultation.

54. The Global Set was recommended as the framework for climate change statistics and indicators to be used by countries when preparing their own sets. It is designed with sufficient flexibility to be adapted to individual countries' climate change concerns, priorities and resources.

55. The self-assessment will provide an understanding of the level of maturity of climate change statistics in the country as well as the efforts needed to make further progress in support of the climate policy objectives.

4.2.2. National action plan

56. The self-assessment will produce the needed understanding of available resources (human and technical), accessible and available data, data gaps and what is still needed to support national climate policies and activities. The needed data-related activities should be prioritized with due consideration for the suitability of type of data source, including costs and reliability. Value is added to the planning and distribution of resources when the statistics that need to be improved are rendered more visible through the self-assessment.

57. To satisfy users who demand climate change data in order to make timely decisions, the following actions need to be taken:

- Identifying an institution with a legal mandate (national statistical office, Ministry of Environment, meteorological institute and so forth) for the production of climate change statistics.
- Identifying all the national institutions involved in the production of climate change statistics.
- Setting up a committee, inter-institutional working group or task force made up of:
 - Representatives of sectoral ministries
 - Agencies involved in the production of climate change statistics
 - Decision makers
 - Other relevant stakeholders.
- Ensuring the regular production and communication of information related to climate change.

- Providing capacity-building or training programmes for staff and members of the committee, inter-institutional working group or task force.
- Developing a plan or a road map for the development of climate change statistics.

58. The prioritization of needed efforts should be articulated in a national programme or national action or implementation plan which may include activities suggested in annex I. The steps outlined in this annex are illustrative and include most of the elements needed for a national programme. National statistical offices, UNFCCC-NFPs and key stakeholders are at liberty to reorder the activities and steps and create Gantt charts to reflect their national circumstances and legal mandates. The duration of preparing and implementing the national programme will also vary depending on the development of the national statistical system in the country.

4.2.3. High-level buy-in

59. It is recommended that the national statistical office, the UNFCCC-NFP and other focal points obtain high-level support from their heads of ministries and agencies. In this way stakeholders will be more amenable to participating and providing more support for budgets covering meetings, staffing and other requirements. This would contribute to ensuring the continuity of resources for the programme.

60. Following the assessment of available and needed data and prioritization of future investments for the most relevant indicators, the next step is to mobilize resources (including existing human and technical resources) needed to set up a national programme and organize the needed consultative and data-collection and exchange processes.

61. Virtual meetings and electronic communication are increasingly used to share information between climate change statistics compilers and data providers. The lack of resources for regular meetings is one of the main barriers to collaboration among institutions for the production of climate change statistics.

62. To ensure a suitable arrangement, the national circumstances should be kept in mind and the following should be considered, as these points will help to assess the needs and implementation modalities for climate change statistics:

- Experiences in producing environment statistics, implementing FDES 2013 and ESSAT; producing environmental accounts using the Central Framework and the Ecosystem Accounting Framework of SEEA 2012; and producing energy statistics using IRES.
- The value or importance of social, economic, demographic, gender and disability statistics for the calculation of climate change indicators.
- A georeferenced information system to calculate numerous indicators of climate change and to monitor coastal and marine waters, droughts and changes in the land that could not be observed without those techniques.
- An inventory of national policies, strategies, national action plans and other related documents mentioning the need for and value of statistics.
- Any progress in sustainable development and related issues, such as the Sustainable Development Goals, green economy policy and others.
- Multilateral environmental agreements that the country has signed and ratified and the status and process of its reporting to those agreements.

63. Funding sources, some of which are suggested in box 5, need to be identified and funding proposals developed based on the self-assessment outcomes and future work prioritization.

Box 5 Funding sources

National statistical systems can be funded as part of the entire national climate change mitigation and adaptation strategy for producing climate change statistics or for estimating, monitoring and providing official statistical data to the UNFCCC-NFP, to be used in reporting.

Some of the agencies and funds which may offer direct or indirect assistance to countries are:

- Global Environment Facility; information available at <https://unfccc.int/topics/climate-finance/funds-entities-bodies/global-environment-facility>.
- Green Climate Fund, established by the Conference of the Parties to the United Nations Framework Convention on Climate Change at its sixteenth session, to support developing countries with projects, programmes, policies and other activities related to climate mitigation and climate adaptation. Information available at https://unfccc.int/process/bodies/funds-and-financial-entities/green-climate-fund?gclid=CjwKCAiAheacBhB8EiwAltVO26bk00K8-sH_tEYzPBffy8VM77IsTAOT9-gzV8FY96iSuoBH631OYxoCTDQQA_VD_BwE.
- Least Developed Countries Fund and Special Climate Change Fund, administered by the Global Environment Facility, which serve the Paris Agreement.
- United Nations:
 - Regular Programme of Technical Cooperation, established by the General Assembly by resolution 58 (I) of 14 December 1946. This supports developing countries in their capacity development efforts, especially those geared towards achieving strategic area 3 of the Cape Town Global Action Plan (<https://unstats.un.org/sdgs/hlg/Cape-Town-Global-Action-Plan/>) for strengthening of basic statistical activities and programmes. More information may be found at <https://unstats.un.org/capacity-development/activities/rptc.cshtml>.
 - Development Account, established by the General Assembly in 1997 by resolution 52/12 B, as a mechanism to fund capacity development projects. It provides a bridge between in-country capacity development entities and serves to promote the exchange and transfer of skills, knowledge and good practices among target countries within and between different geographical regions, and through cooperation with a wide range of partners in the broader development assistance community. More information may be found at www.un.org/development/desa/da/.
 - United Nations Development Programme (UNDP), established in 1965 by the General Assembly as the United Nations global development network and one of the world's largest intergovernmental development agencies. Among other causes, UNDP supports countries' efforts to achieve the 2030 Agenda for Sustainable Development and has eight representation offices and five global policy centres. Information available at www.undp.org.

Potential other sources include:

- Inter-American Development Bank; this works in Latin America and the Caribbean in close cooperation with other development partners to provide technical support and financing to activities that strengthen statistical capacity. The Bank's current focus areas include climate change and environmental sustainability: www.iadb.org/en.
- African Development Bank, with 80 member States, which delivers the financial and technical support for transformative projects. The Bank's statistical capacity-building activities are guided, among other instruments, by the principles of the second phase of the Strategy for the Harmonization of Statistics in Africa (<https://au.int/>), and harmonizing statistics across Africa to inform Sustainable Development Goals. Information available at www.afdb.org/.
- Trust Fund for Statistical Capacity Building, a multi-donor trust fund that works closely with PARIS21 to advance coordinated international efforts to improve statistics globally. Information available at www.worldbank.org/en/data/statistical-capacity-building/trust-fund-for-statistical-capacity-building.
- German Agency for International Cooperation (GIZ), which provides services in the fields of environmental protection, resource conservation, and climate change mitigation. Information available at www.giz.de/en/html/index.html.

4.2.4. National institutional arrangements

64. Institutional arrangements are very important for the development of climate change statistics, and particularly so for developing countries with limited access to resources. The Framework Convention on Climate Change has produced several guidelines related to the preparation of reporting on climate change issues, including a handbook on institutional arrangements to support MRV and transparency of climate action and support,⁴⁷ prepared by the Consultative Group of Experts. In addition, IPCC has guidelines for institutional arrangements⁴⁸ for compiling national GHG inventories and these may be used as examples. Furthermore, ECE has published its Implementation Guidelines for the Conference of European Statisticians' set of core climate change-related indicators and statistics using SEEA and has other resources available that can help countries. National institutional arrangements are dependent on country situations and most countries have appropriate arrangements of some kind, although further development is needed.

65. If a committee, inter-institutional working group or task force on environment statistics exists, this will offer a good basis to incorporate climate statistics. At its forty-seventh session, the Statistical Commission recommended that countries use FDES 2013 to guide the development of climate change statistics and indicators, given the close interrelationship between environment statistics and climate change statistics.⁴⁹ Other key points for setting up the necessary institutional arrangements are:

- The importance of securing the long-term implementation, development and production of statistics as the main objective.
- The need for strengthened capacity and increased finance, because projects often do not continue beyond the initial stage owing to lack of funding, staff and other resources.

Developed countries are less constrained by resources while developing countries tend to require more capacity development, training, and financial and other resources.

⁴⁷ UNFCCC secretariat, Consultative Group of Experts, "Handbook on institutional arrangements to support MRV/transparency of climate action and support" (2020). Available at https://unfccc.int/sites/default/files/resource/Hand%20book_EN.pdf.

⁴⁸ IPCC, "Introduction to the 2006 Guidelines", in *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (2006). Available at www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_1_Ch1_Introduction.pdf.

⁴⁹ See E/2016/24.

4.2.4.1. Defining an institution with a legal mandate for the production of climate change statistics

66. Official statistical information is an indispensable basis for the development of a country. This information must enjoy the total confidence of the public and be comparable with information from other countries. To benefit from this confidence, responsible organizations must determine, according to purely professional considerations, in particular scientific principles and ethical rules, the methods and rules for collecting, processing, storing and presenting data.

67. For these organizations to be credible, they must have laws and regulations, and also provisions governing their operation. In this case, the law governing the operation of statistical systems or institutions must include in its articles the information on environment statistics in general and those related to climate change in particular.

68. A national (or focal) institution with the legal mandate may perform the following functions:

- Set up a department or unit in charge of climate change statistics or incorporate it into an existing environment statistics department, unit or other relevant structure.
- Develop a legal framework of collaboration with other institutions (ministries, meteorological institutes, research institutes and others) with a view to sharing expertise and statistics on climate change. Appropriate memorandums of understanding and terms of reference need to be drafted and signed by the relevant institutions.
- Submit training needs, a workplan and budget proposal to the government or partners for capacity-building or training of staff and stakeholders.
- Establish or strengthen a climate change or environment statistics committee, with the objective of formalizing the commitment of the various institutions that produce information concerning climate change and coordinating implementation of the national set of climate change statistics and indicators. The committee needs a chair and, when necessary, terms of reference defining its objective, composition, expected outputs and timeline. According to the resources and/or the needs of the country, technical, thematic and/or inter-institutional working groups may be established under the committee to ensure the efficient operation of thematic areas.

69. The committee may perform the following functions:

- Develop a road map for the implementation of the Global Set and agree on the expected results of the work. The road map guides the organization and monitoring of the work. It specifies the timetable, and also the role and contributions of each stakeholder. Ideally, the road map should cover both phases – developing the set of indicators and updating them through regular reviews. The road map will constitute a useful framework for establishing the action plan.
- Organize the validation of the data, statistics, indicators and reports produced by the technical, thematic and/or inter-institutional working groups (if established) before submission to a higher-level body for approval or information as appropriate.

- Develop a communication strategy and agree on the dissemination of the national set of climate change statistics and indicators.
 - Integrate the national programme or plan on climate change statistics into the national strategies for the development of statistics and national climate policies.
70. A national example of an institution with a legal mandate is presented in box 6.

Box 6

Mexican national statistics and geographical information system

Mexico has a national statistics and geographical information system, abbreviated as SNIEG. The responsibility to inform and to coordinate that system was assigned to the National Institute of Statistics and Geography (INEGI). To consolidate this mandate, the National Statistics and Geographical Information System Act was enacted in 2008.

The system is formed by a set of units, mainly government agencies organized in four information subsystems. Each subsystem produces technical rules and standards, national interest information and indicators in their thematic scope and competence.

In each subsystem there are supervisory bodies, called specialized technical committees, in which representatives from related federal agencies and from INEGI, grouped by specific themes, participate, discuss and agree on their respective information themes. In particular, the national geographical, environmental, territorial and urban planning subsystem has eight technical committees on the following areas:

- Basic geographical information
- Land use, vegetation and forest resources
- Water
- Climate change, emissions and wastes
- Energy sector
- Regional and urban development
- Registry and cadastral information
- Marine information.

The purpose of the committees is to prepare and review technical standards, methodologies and indicators, required for the integration of the national statistics and geographical information system. For this subsystem, the environmental information production plays a fundamental role in the development of basic environmental statistics and the generation of environmental indicators.

Pursuant to the National Statistics and Geographical Information System Act, a regulatory compilation system is implemented, for which the regulatory provisions have been issued by INEGI in its role as central coordinating unit of the national statistics and geographical information system, www.snieg.mx/scn-acerca-de/.

Through this information infrastructure and organization, Mexico is moving forward in the fulfilment of its international commitments, such as the 2030 Agenda for Sustainable Development, the Paris Agreement and the Sendai Framework.

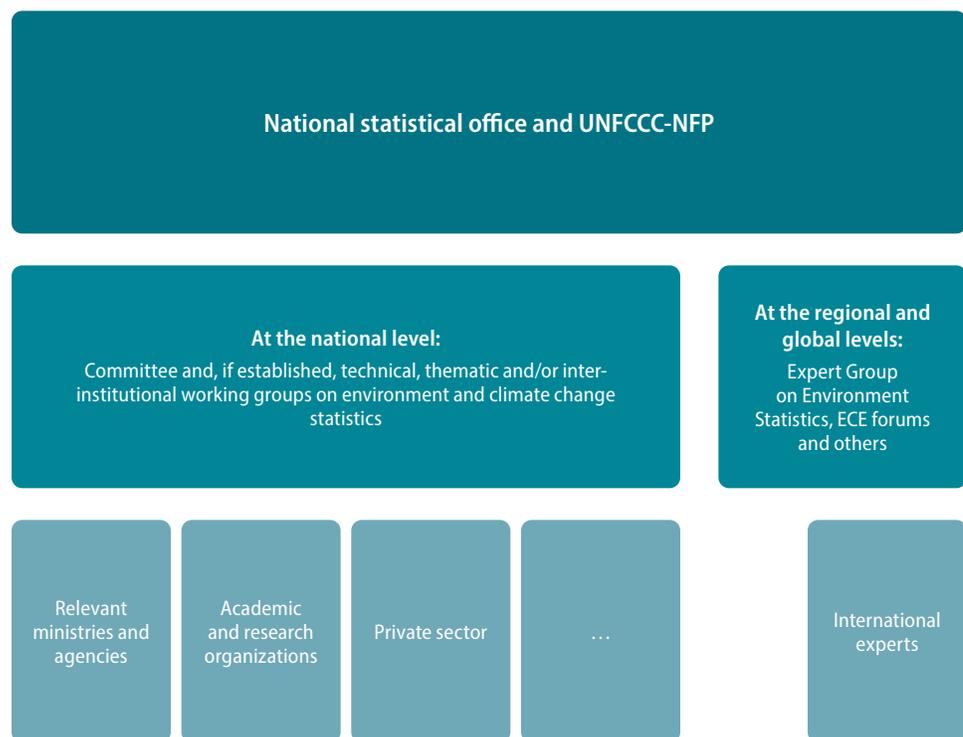
Source: INEGI, www.inegi.org.mx/.

4.2.4.2. Engaging key stakeholders

71. Once the national or focal institution with the legal mandate has been identified and nominated, and its roles and responsibilities have been clearly defined, the identification, selection and involvement of relevant stakeholders represent the next crucial step. The key stakeholders should be part of the committee, and if established, the technical, thematic and/or inter-institutional working groups.

72. The support of national, regional or international partners should also be considered, as they can provide the necessary resources for the successful implementation of the process. A pool of external experts, including consultants, will also be highly desirable, given the specific and multidisciplinary nature of the Global Set. Figure 6 provides an example of the typical stakeholders who may be involved.

Figure 6
Stakeholder engagement in a national climate change statistics programme



4.2.5. Capacity-building at the national level

73. In many countries, statisticians may be less familiar with climate change statistics and their data needs. The climate change statistics compilers may also not be aware of the wealth of data and expertise that they might obtain from national statistical offices. It is recommended that an institutional review and skills capacity assessment be conducted to understand and prioritize capacity development efforts. Given that the statistical system holds a wealth of data with relevance to the compilation of climate change indicators, this knowledge should be improved by allocating more resources to training and capacity-building. For responding to a number of reporting requirements under the Framework Convention on Climate Change, countries need to benefit from training in different aspects related to climate change statistics, such as:

- Completing CISAT
- Collecting and estimating climate change data
- Reporting on climate change
- Developing climate change surveys
- Developing metadata and indicators for climate change statistics
- Filling information gaps
- Establishing baselines for climate change indicators
- Translating the tools and materials (ESSAT, CISAT, MRV framework and others) into indigenous languages
- Training of trainers.

74. The objective of capacity-building and technical assistance or training is to provide participants the key points for understanding the tools and mechanisms, the conditions for their effectiveness, and the experiences of countries in implementing a national set of climate change statistics and indicators.

75. The analysis and interpretation of the data will be facilitated by following the five IPCC areas (drivers, impacts, vulnerability, mitigation and adaptation) for designing climate change policies and measures.

76. Training can be carried out either with the use of operating manuals and technical guides in the language or languages used in the country, through regional, subregional and national workshops, country visits and study tours, bilateral consultations or online training. Training or technical assistance requires the availability of financial means and promotes the sustainability of what has been learned.

4.2.6. Multidisciplinary approach

77. On the climate policy development side there are efforts to establish inter-institutional arrangements aiming to define and monitor policies, which may not take into account such arrangements already in place under the national statistical system. The national statistical system is the combination of statistical organizations and units within a country that jointly collect, process and disseminate official statistics on behalf of a national Government. National statistical systems are expected to be guided by the Fundamental Principles of Official Statistics⁵⁰ and to govern themselves accordingly.

78. As climate change statistics and indicators bring together different stakeholders, it is necessary to identify the institutions involved in the production and use of climate change information. These stakeholders include data producers, decision makers, scientists, ministries and agencies. CISAT will help countries to identify those which are most relevant. The objective of the stakeholder identification process is to constitute or expand the committee, and if established, the technical, thematic and/or inter-institutional working groups. The choice of the group members is made with reference to the indicators contained in the Global Set.

79. If technical, thematic and/or inter-institutional working groups have been established under the supervision of the committee, they may have the following assignments:⁵¹

- To contribute to the determination of priorities and needs for climate change statistics and indicators by assessing the relevance, methodological soundness and availability of data.

⁵⁰ United Nations, "Fundamental Principles of Official Statistics" (2014). See General Assembly resolution 68/261.

⁵¹ If resources do not permit the establishment of technical, thematic and/or inter-institutional working groups under the committee, then the committee will fulfil the suggested activities.

- To provide methodological, statistical and thematic expertise – an effective combination for ensuring stakeholder engagement in the process.
- To undertake data collection or data exchange as appropriate and contribute to database building.
- To compile statistics and indicators, prepare analysis of key findings and draft a report or other relevant thematic output.

80. Since there are various thematic areas in the Global Set, a multidisciplinary approach is crucial for engaging stakeholders and partners. Thus, the committee and, if established, the technical, thematic and/or inter-institutional working groups require participation of experts from climate change, environment, energy, agriculture, transport and infrastructure, finance and economy, disaster and disaster risks, forestry, land-use planning and other areas, as appropriate.

Chapter 5

Production of climate change statistics

81. Data, statistics and indicators on climate change are needed for numerous purposes, such as national development plans; climate change action plans, policies and reports; state of the environment reports; environment statistics plans and reports; and requirements for international commitments (treaties, agreements, conventions) that are ratified or are to be ratified. In the context of reporting under the Framework Convention on Climate Change and the Paris Agreement, the key requirement of a national programme on climate change statistics is to inform and support the planning and implementation of climate actions as required in the nationally determined contributions and national adaptation plans. Decision 5/CMA.3 of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement sets out common reporting tables and common tabular formats for reporting information under the enhanced transparency framework, including indicators for tracking progress towards achieving the nationally determined contributions. The Global Set can support the above by providing suitable indicators and statistics which will assist with improved monitoring of the planned actions and can be applied in the revision of the above planning instruments. The Global Set can also be applied to strengthen the establishment and implementation of a national MRV system and transparency framework. In addition, climate change statistics and indicators are used to respond to users of information, including the national statistics information system, the general public, private sector and to fill information gaps. Many sources of data covering an even greater variety of topics are used to comply with these needs.

5.1. Measurement, reporting and verification system and transparency framework

82. The Consultative Group of Experts under the Framework Convention on Climate Change has published a handbook on institutional arrangements to support the MRV and the transparency of climate action and support⁵² (hereinafter referred to as the “MRV handbook”). It provides the following introduction of MRV:

“The regular collection, analysis and use of reliable information on climate action and support to reduce GHG emissions and increase resilience, and data on GHG emission trends, both historical and projected, is essential for evidence-based decision-making and information-sharing, which in turn build trust and understanding and promote stakeholder engagement. This data collection and reporting activity forms a critical component of what is commonly known as ‘MRV’ under the Convention and has recently been encapsulated by the term ‘transparency’ under the Paris Agreement. ... the term ‘transparency’ refers to MRV activities associated with both the existing MRV arrangements under the Convention and the [enhanced transparency framework] under the Paris Agreement.

...

⁵² UNFCCC secretariat, Consultative Group of Experts, “Handbook on institutional arrangements to support MRV/transparency of climate action and support” (2020). Available at https://unfccc.int/sites/default/files/resource/Hand%20book_EN.pdf.

“The [enhanced transparency framework] under the Paris Agreement builds on and enhances the existing MRV arrangements and establishes a framework for all Parties to operate under a common set of modalities, procedures and guidelines (MPGs) with flexibility for those developing country Parties that need it in the light of their capacities.

“The transition from the existing MRV arrangements to the [enhanced transparency framework] will introduce enhanced scope and depth of reporting for developing countries, which underscores the importance of having strong sustainable institutional arrangements in place. The enhanced scope and depth of reporting constitutes a significant challenge in terms of the resources and efforts needed in responding to the reporting requirements. A continuous process of improvement, collection, processing, analysis, compilation, reporting and review of data is likely to fully occupy a core team of national experts throughout the two-year reporting cycles. In addition, the process will require engagement with a broad range of stakeholders for the collection of data and the use of outputs by decision makers.”

83. According to the MRV handbook, the thematic scope of reporting under the enhanced transparency framework is the following.

Theme	Sub-themes and data requirements
<p data-bbox="240 1003 461 1031">National GHG inventory</p> 	<ul data-bbox="641 1010 1422 1247" style="list-style-type: none"> • National circumstances and institutional arrangements; • National inventory report of emissions by sources and removals by sinks of GHGs; • Information on methods and cross-cutting elements (e.g. information on the category and gas, and the methodologies, emission factors and activity data used at the most disaggregated level; description of key categories; recalculations; uncertainty assessments; assessment of completeness; and quality assurance/quality control plan); • Estimates of emissions and removals for all categories, gases and carbon pools considered in the GHG inventory; • Consistent annual time series.
<p data-bbox="240 1287 337 1314">Mitigation</p> 	<ul data-bbox="641 1293 1403 1501" style="list-style-type: none"> • National circumstances and institutional arrangements; • Description of the nationally determined contribution; • Information necessary to track progress made in implementing and achieving its nationally determined contribution; • Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans; • Projections of GHG emissions and removals, as applicable; and • Other information relevant to tracking progress.
<p data-bbox="240 1539 347 1566">Adaptation</p> 	<ul data-bbox="641 1545 1435 1864" style="list-style-type: none"> • National circumstances, institutional arrangements and legal frameworks; • Impacts, risks and vulnerabilities, as appropriate (current and projected climate trends and hazards, observed and potential impacts of climate change, including sectoral, economic, social and/or environmental vulnerabilities); • Adaptation priorities and barriers; • Adaptation strategies, policies, plans, goals and actions to integrate adaptation into national policies and strategies; • Progress on implementation of adaptation; • Monitoring and evaluation of adaptation actions and processes; • Information related to averting, minimizing and addressing loss and damage associated with climate change impacts; • Cooperation, good practices, experience and lessons learned.

Theme	Sub-themes and data requirements
<p>Support</p> 	<ul style="list-style-type: none"> • National circumstances, institutional arrangements and country-driven strategies; • Description of underlying assumptions, definitions and methodologies used to provide information on support provided, mobilized, needed and received; • Information on financial support provided, mobilized, needed and received under article 9 of the Paris Agreement; • Information on technology development and transfer provided, needed and received under article 10 of the Paris Agreement; • Information on capacity-building support provided, needed and received under article 11 of the Paris Agreement; • Information on support needed and received for the implementation of article 13 of the Paris Agreement and transparency-related activities, including for transparency-related capacity-building.

84. A national programme on climate change statistics should not duplicate the processes set in place for MRV and for transparency, it should rather complement and strengthen the existing processes. If, however, such processes have not yet been set up, the structure of the Global Set can be applied to frame the contents of a domestic or national-level system of a MRV and transparency system. A national example is shown in box 7.

Box 7

Climate change knowledge database and repository of Suriname

In June 2022, Suriname launched a knowledge database which serves as a central platform for climate change statistics and indicators and also for national climate change reports. The goal is to publish and disseminate official and formal climate and environment information for national policy and planning. The system will serve as the MRV tool required for the purpose of reporting to the Framework Convention on Climate Change; specifically, it assesses and tracks the implementation of mitigation and adaptation actions including the status of implementation and progress achieved against the national climate change goals.

“Dondru”, from “donder”, which means “thunder” in Dutch, was chosen as the name of the Surinamese MRV tool to emphasize the national importance of climate change effects (<https://dondru.sr/mrv>). It will complement current efforts to develop the Suriname National Environmental Information Network. The network aims to produce official and formal environmental data and information for national policy and planning. With this information, policymakers could analyse the environment’s condition and follow trends to determine policy adjustments. This will be conducive to more investment in capacities needed for better environmental management. The development of Dondru was funded by the Inter-American Development Bank, while the system was created through a collaboration between the Ministry of Spatial Planning and Environment, the National Institute for Environment and Development in Suriname, Adept (a national software company that created the database and repository) and the General Bureau of Statistics.

Box 7 (continued)

The General Bureau of Statistics supported this effort by drawing on its long and varied experiences in environment and climate change statistics and built-in quality assessment and quality control protocols. The Bureau has contributed to the development of the Global Set and participated in the global consultation on the draft Global Set. The UNFCCC-NFP and the National Institute for Environment and Development in Suriname contributed to the completion of the consultation and subsequently applied the outcomes to structure the Dondru database. The General Bureau of Statistics is now in the stage of preparing an initial climate change statistics report, which will be published in 2023. The environment statistics publications produced by the Bureau are an important tool that is used by the Surinamese Government for environment and climate change policy. Data from the ninth and tenth compendiums of environment statistics were employed in preparing the country's third national communication (https://statistics-suriname.org/wp-content/uploads/2022/12/GBS_10th-Environment-Statpub_15dec2022-1.pdf). In addition, the Global Set was applied to streamline national efforts under related frameworks, including the core set of the Caribbean Community, FDES 2013, the Sustainable Development Goals and the Sendai Framework.

Originally, the MRV tool was promoted for tracking GHG emission data, but the tool used by Suriname goes beyond GHG emission indicators and also contains selected indicators across other IPCC areas: drivers, impacts, mitigation and adaptation. The General Bureau of Statistics provided advice during the design stage for which the structure of the Global Set was followed. Relevant indicators from the Global Set were applied in the system, and the available data (from the General Bureau of Statistics and other sources) were populated for some of these indicators. The Global Set was used as a bridge to connect the outcomes from the country's national communications, national adaptation plans and nationally determined contributions and will strengthen monitoring of the country's climate change policy and plans. The production of the compendiums of environment statistics and the planned climate change statistics compendium are made possible through UNDP funding, under the Global Climate Change Alliance phase 2 project (www.undp.org/suriname/global-climate-change-alliance-gcca-phase-2). This work on environment statistics will also help to provide continuous updates in the Dondru MRV tool, necessary for the dissemination of climate change statistics to the public.

Source: General Bureau of Statistics Suriname, <https://statistics-suriname.org/>.

5.2. Data sources for climate change statistics

85. To compile a national set of climate change statistics and indicators, the following main data sources based on FDES 2013⁵³ are used:

- i) Censuses such as population and housing, economic, agricultural or other sectoral censuses, which include environmental and climate change aspects. An example is shown in box 8: the experience of the United Republic of Tanzania in integrating climate change questions into population and housing census questionnaires. Specific environmental censuses may cover establishments engaged in activities such as water management or waste management;
- ii) Sample surveys include general purpose instruments (which may cover environmental issues) such as household surveys, business surveys and other sectoral surveys. They also include emerging surveys specifically designed to gather environmental and climate change information, namely,

⁵³ See United Nations, Statistics Division, *Framework for the Development of Environment Statistics (FDES 2013)*, table 1.1, p. 12. Available at <https://unstats.un.org/unsd/envstats/fdes.cshhtml>.

climate change surveys, environmental management surveys for business establishments (including industry, tourism and agriculture), municipal environmental management surveys and public opinion polls on the environment and climate change, among others. An example is shown in box 11: the national climate change survey of Nepal;

- iii) Administrative records are records collected and maintained by different government and non-governmental agencies for administrative purposes, at various levels (including national, regional, provincial and municipal) such as customs records (imports); sectoral ministry records; public finance and budget records; tax return records; and environmental authority records;
 - iv) Remote sensing sources include earth observation and atmospheric measuring tools that produce images and their interpretation: satellite imaging, aerial photography, geodata, geodesy and geomatics;
 - v) Monitoring systems include various quality and pollution monitoring stations and networks such as urban air pollution monitoring stations, surface water quality monitoring systems, glacier monitoring systems and seawater or coastal water quality monitoring systems. These include meteorological and hydrological monitoring networks;
 - vi) Scientific research and special projects cover data sources such as data collected by universities, research agencies and organizations to fill knowledge gaps and assess effectiveness of or develop alternative policies.
86. Additional sources apply in the context of climate change, for example:
- Inventories applicable to GHG emissions and forest-related indicators and statistics
 - Projections and scenario modelling
 - Relevant reports, such as national communications, biennial reports and biennial update reports, for countries that ratified the Framework Convention on Climate Change.

Box 8

Experience gathered by the United Republic of Tanzania in the integration of climate change questions into population and housing census questionnaires

The United Republic of Tanzania is making concerted efforts to enhance the availability of and access to climate change statistics in response to an unprecedented demand for climate change data to facilitate reporting, policy formulation, monitoring and evaluation of development programmes. The Tanzanian National Bureau of Statistics participated in the development of the Global Set and, in response to the global consultation of 2021, produced a thorough self-assessment which revealed that 91 of the 134 indicators of the draft Global Set were relevant and data availability is expected to improve over time.

One of the initiatives taken by the National Bureau of Statistics is the harnessing of opportunities to fill data gaps via traditional statistical data sources to collect climate change information needed for national climate policies and international reporting to the Framework Convention on Climate Change. For the first time, the United Republic of Tanzania managed to integrate climate change questions and more environment questions into the 2022 population and housing census, which was held in August 2022. The census includes three questionnaires, namely: the main questionnaire; a buildings questionnaire; and a community questionnaire. Environmental and climate-related questions are included in all three (www.nbs.go.tz/index.php/sw/sensa-2022).

Box 8 (continued)

Apart from the traditional environment questions in the census questionnaires, which focus on sanitation, sources of drinking water and sources of energy for household use in cooking and lighting, the questionnaires in the country's 2022 census captured information related to methods used by households to dispose of waste, the type of institutions responsible for the collection of waste generated by households, whether households sort kitchen waste into categories such as plastic, glass, metal and electronic waste, and the main method that is used by households to dispose of e-waste. In addition, information related to knowledge of climate change and perceptions of communities regarding the impacts of climate change were collected at the community level.

The results from the population and housing census will contribute to the data gathered for the national communication to the Framework Convention on Climate Change by the United Republic of Tanzania. Data from the census will contribute to an updated report on climate change statistics, the first such report (the 2019 national climate change report) having been published in January 2020. Since population and housing censuses cover the entire national population, they have the advantage of yielding comprehensive national-level information on the status of a particular environment phenomenon of interest. Thus, of the 158 indicators of the Global Set, 33 indicators (20.9 per cent), from all five areas, but mostly in vulnerability, can benefit either directly or indirectly from the population and housing census. In addition, approximately 11 indicators of the Global Set related to education, public perception, awareness and adaptation activities, which are mostly at tier 3 at present, would benefit tremendously from the inclusion of climate questions in the population and housing census.

Besides the 2022 population and housing census, the National Bureau of Statistics, as the national coordinator for official statistics in the country, compiles data related to energy, agriculture, land use, forestry and waste and submits them to the Vice President's Office (UNFCCC-NFP) to support the preparation of reports and reporting to the Framework Convention on Climate Change.

Source: National Bureau of Statistics, www.nbs.go.tz/index.php/en/.

87. The field of climate change statistics also relies on a broad range of data derived from traditional and non-traditional sources of statistics, including big data, modelling and data from academic research. This statistical field is therefore a good illustration of the concept of a data ecosystem for which PARIS21 is developing a climate change data ecosystem assessment framework.⁵⁴ Additional guidelines and implementation support for the assessment framework will be developed by PARIS21 in the future.

88. Since data are likely to be derived from different sources, differences in timing and reporting practices when providing climate change statistics may result in inconsistencies among data from different agencies. For that reason, compilers of statistics and indicators, and also other users, should be cautious when combining these data. Publications must present data that are consistent in definition, timing and methods. Although the list below is not exhaustive, it provides a starting point for possible sources of country-specific data:

- National and subnational statistical offices
- Ministries, departments and agencies responsible for the production of statistics
- Facility-level data, such as production data (on minerals, energy, and other such matters), pollutant release registers, air and water emissions, and others, which may sometimes be used for estimating missing values

⁵⁴ Partnership in Statistics for Development in the 21st Century, *Envisioning a Climate Change Data Ecosystem – A Path to Co-ordinated Climate Action* (Paris, 2022).

- Expert information, such as expert judgments on the level of emissions from a particular factory or facility, area of a particular type of forest or its annual deforestation rate
- IPCC emission factor database, which is used for calculating GHG emissions
- Reference libraries (national libraries) for certain types of data, such as historical lists of disasters and related events
- Scientific and technical articles in environmental books, journals and reports which can be used to cross-check existing data or other information
- National GHG inventory reports from parties to the Framework Convention on Climate Change
- National adaptation plans from parties to the Framework Convention on Climate Change
- Remote sensing data, such as geospatial products for land use, land management, soils and climate, and GHG measurements.

89. GHG inventory compilers need to identify and communicate with data providers. Regulatory authorities and official statistical bodies have a responsibility to take representative samples and accurate measurements, and often adopt agreed standards. Once the inventory compiler has selected a data set, the next step will be to develop a more formal specification and data request and engage with data suppliers to provide tailored data sets from their information. Similar considerations may apply to many other topics contained in the Global Set.

5.2.1. Mapping and assessing sources of available statistics and indicators

90. The CISAT package, including the Global Set metadata, will facilitate the review, identification and mapping of data, statistics and indicators available in the country. Through the committee, and if established, the technical, thematic and/or inter-institutional working groups and other interactions, the relevant statistics and indicators will be determined and the metadata sheets analysed. Such an analysis would take into account, among other things, the relevance of each indicator for the country and any policies, strategies, plans and multilateral environmental agreements; international guidelines and classifications as specified in the metadata; the availability of all statistics used to calculate the indicator; ease of understanding of the methodology; and quality and accuracy of the data set. National statistical offices have a specific role to fulfil in the process of assessing the quality of the data from various sources. In a survey, for example, the collection of data proceeds along the following steps:

- Survey design – the methodology to select the sample from stakeholders, the approach to select the sample, the adequate sample size and the method through which the survey will be organized, are defined.
- Survey tools development – in line with the focus of the study, objectives are translated into measurable factors that contribute to that focus and are elaborated by experts in the measurement sciences, namely, climate change and environment statisticians.
- Survey execution – using the survey tools (paper or computer-assisted personal interviewing, a pilot survey should first be conducted to test both the tools and the survey procedure before the actual survey is conducted. Once field testing has been completed, the survey is conducted and the data are collected, coded and processed.

91. Environment and climate change data may be derived from sources such as censuses, surveys, administrative records, monitoring systems and remote sensing. In addition, data from inventories, modelling and big data are increasingly being used by data providers other than the national statistical offices.

92. Furthermore, from the perspective of the national statistical office, the context of environment and climate change statistics may be rather different when compared to both economic and social statistics. Traditionally, a national statistical office may be the custodian of enterprise and household surveys, which are a main data source for economic and social statistics, respectively. However, a national statistical office may not necessarily be a traditional custodian or a prime data source for environment and climate change statistics. In this context, a national statistical office may consider either designing its own surveys for collecting such statistics or adding modules of questions on environment and climate change to either censuses or enterprise and household surveys.

5.2.1.1. Quality assurance

93. National statistical offices and other data providers disseminate statistical products that are subject to criteria guaranteeing the accuracy, timeliness and relevance of their outputs. These criteria are based on laws within the country and also on international statistical standards. Quality management principles and procedures adopted by data providers ensure that each stage of the statistical process from data collection to dissemination has certain benchmarks to ensure consistency, impartiality and validity. These standards may also include a release schedule of official data for improved dissemination of data to users.

94. Quality assurance, quality control and verification procedures of the MRV and the transparency process for the development of reliable national GHG inventories (national emission data) and inventory improvement are as follows:

- Paris Agreement, article 13, paragraph 7: “Each Party shall regularly provide ...: (a) A national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases, prepared using good practice methodologies accepted by the Intergovernmental Panel on Climate Change”.
- Quality assurance activities, outside the actual compilation of the inventory, include reviews and audits to assess the quality of the inventory, to determine the conformity of the procedures taken and to identify areas where improvements could be made.
- Quality control is performed by personnel compiling the inventory and constitutes a system of routine technical activities to assess and maintain the quality of the inventory as it is being compiled.
- Country-specific emission factors may be developed at a national or other aggregated level within the country based on prevailing technology, science, local characteristics and other criteria.
- Chapter 6 of the IPCC 2006 Guidelines for national GHG inventories and their 2019 refinement provide details on the above.⁵⁵

95. Chapter 7 of the Handbook on Management and Organization of National Statistical Systems provides comprehensive guidance to national statistical offices on quality management systems and standards, frameworks, guidance and tools, evaluation and implementation. Quality assurance tools, developed by the United Nations and other agencies, that have been used by national statistical offices include:

⁵⁵ IPCC, "Chapter 6: Quality assurance/quality control and verification", in *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Volume 1: General guidance and reporting (Hayama, Japan, Institute for Global Environmental Strategies, 2006). Available at www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_6_Ch6_QA_QC.pdf. See also the 2019 refinement to the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

⁵⁶ United Nations, Statistics Division, *United Nations National Quality Assurance Frameworks Manual for Official Statistics: Including Recommendations, the Framework and Implementation Guidance* (New York, 2019). Available at <https://unstats.un.org/unsd/methodology/dataquality/references/1902216-UNNQAFManual-WEB.pdf>.

⁵⁷ European Statistical System, *Quality Assurance Framework of the European Statistical System* (Luxembourg, 2019). Available at <https://ec.europa.eu/eurostat/documents/64157/4392716/ESS-QAF-V1-2final.pdf/bbf5970c-1adf-46c8-afc3-58ce177a0646>.

⁵⁸ European Statistical System, *European Statistics Code of Practice for the National Statistical Authorities and Eurostat (EU Statistical Authority)* (Luxembourg, 2018). Available at <https://ec.europa.eu/eurostat/documents/4031688/8971242/KS-02-18-142-EN-N.pdf/>.

- United Nations National Quality Assurance Frameworks Manual for Official Statistics (2019),⁵⁶ a guidance document for developing a quality assurance framework or a reference for national statistical offices that have already developed an assurance framework.
 - Quality Assurance Framework of the European Statistical System,⁵⁷ which covers regulations, standards, guidelines and tools directed at countries in the European Union. Together with the European Statistics Code of Practice,⁵⁸ this constitutes the common quality framework of the European Statistical System, which also incorporates a quality declaration and principles, the Statistics Quality Framework of the European Statistical System, and the European Statistical System Handbook for Quality and Metadata Reports,⁵⁹ along with other quality management tools.
 - Data Quality Assessment Framework and Data Quality Program of the International Monetary Fund (IMF),⁶⁰ which is designed for use by IMF staff and national statistical offices in assessing the quality of specific types of national data sets. Its aim is to complement the IMF Special Data Dissemination Standard and the enhanced General Data Dissemination System and it primarily covers economic and finance statistics.
 - African Charter on Statistics,⁶¹ which has six quality principles in 25 quality statements covering most of the quality principles in the European Statistics Code of Practice. These principles, however, have been reorganized and tailored to the African situation.
 - Economic Commission for Latin America and the Caribbean (ECLAC) Code of Good Practice in Statistics for Latin America and the Caribbean,⁶² which was modelled on the 2008 European Statistics Code of Practice and extended to include coordination of the national statistical system.
 - Caribbean Community Statistics Code of Practice for Member States and Associate Members,⁶³ which is based on the European Statistics Code of Practice and has 15 principles and 78 indicators.
 - Association of Southeast Asian Nations (ASEAN) Community Statistical System Code of Practice,⁶⁴ which is also modelled on the 2008 European Statistics Code of Practice but has fewer principles and indicators.
 - ECE quality indicators for the Generic Statistical Business Process Model,⁶⁵ which sets out a template for describing surveys and administrative data collections in eight phases and 44 subprocesses with a set of indicators to monitor the quality of the production processes for each phase.
96. A national example of statistical quality assurance is presented in box 9.
97. While there are national statistical offices that have used the United Nations National Quality Assurance Frameworks Manual for Official Statistics or the European Statistics Code of Practice, others have developed their own national quality assurance frameworks, guidelines and tools, often based on the frameworks listed earlier.
98. A self-assessment checklist for national statistical offices, based on the United Nations National Quality Assurance Frameworks Manual for Official Statistics, is available at <https://unstats.un.org/unsd/methodology/dataquality/tools/>. This self-assessment checklist is intended for the conduct of regular and rigorous quality assessments with the objective of identifying improvement actions. It may also be used to provide an initial assessment for learning purposes or to introduce staff to the practice of quality assurance.
- ⁵⁹ European Statistical System, *European Statistical System Handbook for Quality and Metadata Reports* (Luxembourg, 2021). Available at <https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-GQ-21-021>.
- ⁶⁰ IMF, "Data Quality Assessment Framework and Data Quality Program". Available at www.imf.org/external/np/sta/dsbb/2003/eng/dqaf.htm#III.
- ⁶¹ African Union, *African Charter on Statistics*, adopted by the Assembly of the African Union at its twelfth ordinary session (2009). Available at <https://au.int/en/treaties/african-charter-statistics>.
- ⁶² ECLAC, Statistical Conference of the Americas of the ECLAC, *Code of Good Practice in Statistics for Latin America and the Caribbean* (Santiago, 2011). Available at https://repositorio.cepal.org/bitstream/handle/11362/16423/FILE_148024en.pdf.
- ⁶³ Caribbean Community, *CARICOM's Statistics Code of Practice for Member States and Associate Members* (2009). Available at https://caricom.org/documents/13410-caricom_statistics_code_of_practice.pdf.
- ⁶⁴ Association of Southeast Asian Nations, "ASEAN Community Statistical System (ACSS) Code of Practice" (2012). Available at www.aseanstats.org/wp-content/uploads/2017/02/Code-of-Practice-ADOPTED-CLEAN.pdf.
- ⁶⁵ ECE, "Quality indicators for the Generic Statistical Business Process Model (GSBPM)". Available at <https://statswiki.unecce.org/display/GSBPM/Quality+Indicators>.

Box 9**United Kingdom statistical quality assurance**

Official statistics produced in the United Kingdom need to abide by the Code of Practice for Official Statistics. As stated in its foreword, the Code “aims to provide the framework to ensure that statistics are trustworthy, good quality, and are valuable – that they measure the things that most need to be measured”. The code is also accessible at About the Code – Code of Practice for Statistics (<https://code.statisticsauthority.gov.uk/the-code/>).

In addition, the following quality guides may also be relevant:

- For working with administrative data, the Quality Assurance of Administrative Data. This regulatory standard confirms the quality assurance arrangements that are required for statistics that are compiled using administrative data, to ensure compliance with the Code of Practice for Official Statistics. The Administrative Data Quality Assurance Toolkit is the mechanism used by the United Kingdom Statistics Authority to determine compliance. The toolkit is also available from the website of the Office for Statistics Regulation on administrative data and official statistics.
- Guidance on communicating quality, uncertainty and change. In line with the Code of Practice for Official Statistics, the guidance offers practical advice which can be applied to all sources of statistics, including surveys, censuses, and administrative and commercial data. It includes examples of good practice, and also suggested standard wording to be used when appropriate.
- Guidance on producing quality analysis for government, known as The Aqua Book. This is also available on the United Kingdom government website: www.gov.uk.

Information on the organization of national statistical systems in the United Kingdom may be found via the following link: www.statisticsauthority.gov.uk.

Source: Office for National Statistics, www.ons.gov.uk/methodology/methodologytopicsandstatisticalconcepts/qualityinofficialstatistics.

99. Chapter 6 of the United Nations Manual focuses on the implementation of quality assurance within a statistical system. Emphasis is placed on the fact that such systems extend well beyond the national statistical offices themselves, and must include other producers of official statistics, typically, the statistical units of government ministries, departments, agencies, and regional and local government offices. Concepts, definitions, classifications and sampling frames must therefore be carefully harmonized. The upholding of confidentiality while striving for efficiency via data-sharing agreements is also of paramount importance. Furthermore, at an international level, acknowledgement of international policies, including international reporting obligations, should be considered.

5.2.1.2. Generic Statistical Business Process Model

100. The Generic Statistical Business Process Model⁶⁶ developed by ECE may be applied to all activities undertaken by producers of official statistics. The Model describes and defines the set of business processes needed to produce official statistics. It provides a standard framework and harmonized terminology to help statistical organizations to modernize their statistical production processes and to share methods and components. The Model can also be used for integrating data and metadata standards, as a template for process documentation, for harmonizing statistical computing infrastructures, and to provide a framework for process quality assessment and improvement. The tool describes the set of processes used to produce official statistics following a logical sequence of steps. It also provides organizations with a structure for

⁶⁶ ECE, “Generic Statistical Business Process Model”. Available at <https://statswiki.unece.org/display/GSBPM>.

the organization and storage of documentation, thus promoting the standardization of processes. It is employed for the collection and processing of data, and also for revisions or recalculations of existing data necessitated by improvements in data collection or changes in methodology. From this, revised outputs are produced and disseminated, and the metadata updated, if necessary.

101. The Generic Statistical Business Process Model comprises the following phases: to specify needs; to design; to build; to acquire data; to profile and prepare data; to integrate, estimate and compile; to analyse; to disseminate; and to evaluate. One strength of the Model is that it can be used independently of statistical data sources, such as censuses and surveys, administrative records and others. The tool is consistent with frameworks such as the United Nations National Quality Assurance Frameworks Manual for Official Statistics.

5.2.2. Defining and prioritizing gaps in data and methods

102. With the overall aim of serving as a tool for data quality assessment and improvement, the Generic Statistical Business Process Model is known to be useful in identifying data gaps and areas of insufficient documentation in existing processes. The Model has been extensively taken up by ECE member States, and there are also good examples of its application available from Australia (applied to price indexes), Belarus (applied to assess existing processes) and Denmark (applied to employment surveys and register maintenance). Application of the Model for the design of a survey module on climate change and natural disasters statistics may be seen in box 10.

Box 10

Use of the Generic Statistical Business Process Model in the climate change and natural disasters survey module

No country is immune to the impacts of climate change, much less the Pacific island countries and territories. There is little information, however, on the impact of potential climate change and the adaptation strategies at household and local levels. This could compromise the effectiveness of national adaptation plans, disaster risk reduction plans and other mitigation and adaptation-related targets and commitments, which depend on the availability of high-quality data.

To fill this data gap, a project on statistical innovation and capacity-building in the Pacific, implemented by the Pacific Community (www.spc.int), was established to improve the quality of data collection and accessibility to comparable data in the Pacific island countries and territories. One component of the project is the development of a climate change and natural disasters survey module, which will make it possible to collect and use climate change and natural disaster data in population censuses and household surveys.

The Generic Statistical Business Process Model was applied in the construction of this survey in particular, Phase 1: Specify needs. User needs were identified which included an analysis of the statistics, methods and sources required to arrive at the objectives of the survey. The survey data will also support the monitoring of progress towards Sustainable Development Goal 1, in particular target 1.5: By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters; and Goal 13: Take urgent action to combat climate change and its impacts. In addition, the survey module is intended to support countries in reporting some of the statistics and indicators set out in FDES 2013 and the Global Set.

Source: The Pacific Community, www.spc.int/.

103. The set of questions in CISAT will assist in defining the data gaps for those statistics and indicators that are both relevant and applicable in a country. If methods are lacking for highly relevant indicators, their development needs to be prioritized. There could be cases where methods exist, such as survey and questionnaire templates, but no data can be collected because of the lack of resources, in which case the application of these methods for the collection of the respective data will be prioritized. In cases where both methods and data are lacking for highly relevant indicators, priority will need to be given to the allocation of the required higher amount of resources.

5.2.3. Establishing data-collection processes

104. The global consultation revealed that there are countries where the national statistical offices have developed a specialized climate change survey (see box 11) or added a climate change module within an existing census (see box 9) or survey.

105. Interest in using surveys and censuses is growing and will contribute to the filling of data gaps, in particular those in the social and economic domains.⁶⁷ When designing such data collection instruments, the following actions should be undertaken:

- Establishing an action plan for the collection of missing relevant data and implementation of the package (from the design of the data collection forms (questionnaires) to the publication).
- Scrutinizing the methodology for collecting the data and updating it if necessary.
- Designing and validating the template/questionnaire with stakeholders.
- Completing the data collection exercise.
- Authenticating the data with the help of stakeholders.
- Validating the data with the committee.

5.2.4. Database building

106. The CISAT template serves as the overall structure of a database in which only the relevant and applicable indicators in the country should be retained and additional, country-specific ones should be included. In the case of indicators and statistics with existing data collection, storage and dissemination processes, such as national GHG inventories, the latter should be linked or referenced in the template. In other cases, data sources need to be identified, as many of the data are from secondary sources. This is the case with data from administrative sources such as registers (births and deaths, population, tourism, forest inventories, and others), or even summarized or processed raw or primary data.

107. Overall, in each of the five areas of drivers, impacts, vulnerability, mitigation and adaptation, a number of indicators will apply. For each of these areas the relevant statistics and indicators should populate the database according to corresponding time periods and other related information.

5.2.5. Data exchange protocols

108. Most countries have a national strategy for the development of statistics or a similar strategy for the coordination of the stakeholder institutions, enabling them to collaborate within the national statistical system. Some countries abide by standards such as the General Data Dissemination Standard⁶⁸ or the Special Data Dissemination Standard.⁶⁹ Similar systems may be used to ensure the regular and sustained production of statistics.

⁶⁷ See examples of environmental surveys on the Statistics Division's website: "Compilation of environmentally-related censuses and surveys and specialized environmental surveys", available at <https://unstats.un.org/unsd/envstats/censuses/>.

⁶⁸ IMF, Dissemination Standards Bulletin Board (DSBB). Available at <https://dsbb.imf.org/>.

⁶⁹ Ibid.

Box 11**National climate change survey of Nepal**

Nepal is experiencing the impact of climate change, which is already causing serious threats to growth and development with its direct and indirect impact on the environment, and also on the economy, society and culture. To improve knowledge about the impacts of climate change and appropriate adaptation practices, the National Statistics Office of Nepal designed a national climate change impact survey, which was first conducted in 2016 with a second round in 2022/23.

The first survey (see survey questions in annex 2 to the statistical report on the results from the survey, https://cbs.gov.np/wp-content/uploads/2018/12/National-Climate-Change-Impact-Survey-2016-Report_final.pdf) was the milestone for climate-related data and provided a comprehensive baseline picture of the climatic situation of the country. It also served as an important instrument for policy integration and assisted in informed decision-making. Besides providing detailed information on the climate change situation, the survey revealed the status of data availability and data sources for climate change and environment statistics in Nepal. The first survey contained household level questions and the results were used for the development of the national adaptation plan, the nationally determined contribution and the third national communication to the Framework Convention on Climate Change.

To further facilitate national climate policies and reporting to the Framework Convention on Climate Change, the national statistical office has led the process of the development of the national framework on climate change statistics and indicators for Nepal. Based on the framework developed, the national statistical office has completed the first ever national-level climate change statistics and indicators report for Nepal, using the Statistics Division's Global Set of Climate Change Statistics and Indicators with currently available data. The national indicators have been customized addressing the national context in seven themes: namely, emissions, climate-induced disasters, impact, exposure, sensitivity, adaptive capacity and mitigation capacity.

The second national climate change survey was improved based on the lessons from the first. It follows national frameworks which embrace the concepts of vulnerability and risk, along with loss and damage, and comprises 12 modules. The preliminary work of the second survey has been completed. The national statistical office has finalized the household questionnaire and manual. In the second survey, the national statistical office has also developed a community questionnaire to capture climate change-related activities, quantitative information and perception about climate change at the community level. The sample design was completed with technical support from ESCAP. A total of 326 primary sampling units have been selected from all over the country. One community questionnaire is to be completed by each sampling unit. In the first stage, the listing of households will be completed and systematic sampling developed with a view to selecting 20 households from each primary sampling unit. In this way, the household level data will be collected from 6,520 households and the community-level data from 326 primary sampling units.

The national statistical office is planning to fill the household questionnaire with the use of tablets and the community questionnaire on hard copy. The second survey has expanded its scope, also addressing loss and damage, impacts, perception and awareness, adaptation (mostly in the agriculture sector), and mitigation (energy, including the production and use of renewable energy, fuel used for cooking, and other issues). In this way, the survey will fill many gaps in the national framework on climate change statistics and indicators. The UNFCCC-NFP has been involved in the design of the survey and UNDP Nepal provided technical support for the survey activities (design, data analysis, report writing).

Source: National Statistics Office of Nepal, <https://nsonepal.gov.np/en>.

109. Data exchange protocols and related infrastructure are needed to specify the way in which information is shared between producers and clients. This type of exchange can also be used to store information online (creating an online library). To guide clients and promote clarity, the data exchange protocol is a document implemented by the country. The protocols are periodically updated to provide current and accurate guidance. Data exchange involves the term “client”, which can cover individuals, families, groups, other organizations and entire communities, as well as casework, participants, audiences and one-off contacts.

110. Data exchange protocols are designed to accommodate the different ways in which organizations collect and report client-level data. Some organizations choose to use data exchange protocols to collect and store personal information, whereas others do not. Where an organization stores personal information in the data exchange, only the organization has access to the personal information thus stored.

5.3. Dissemination of national climate change statistics and indicators

111. Dissemination is the phase in statistical processing in which data collected and compiled by national statistical offices and other statistical agencies are released to the public. Climate change statistics are compiled and disseminated in different ways. Responses to the global consultation indicated that climate change statistics have been included in environment statistics compendiums and yearbooks, in chapters and sections in a statistical yearbook, and in other formats, including databases and websites; electronic statistical tables; official statistics portals; online synthesis; shared environmental information system indicators; annual environmental accounts; information systems on climate change, and others. Some countries disseminated climate change statistics in multiple formats. Examples of national statistical offices producing a separate report on climate change statistics are also on the increase.⁷⁰

112. The following formats for disseminating climate change statistics and indicators prevail:

- Environment and climate change statistics compendium
- Statistical yearbook, including environment statistics or a chapter or section within a yearbook
- Climate change statistics bulletin or report
- State of the environment report
- Websites, databases and portals.

5.3.1. Publication guidelines

113. The publication of climate change statistics and indicators is an essential feature of statistics as a public good. These statistics and indicators should be readily and easily accessible to the public. To improve the dissemination of frequent and timely information, the protocols on publication may be based on existing standards, such as the General Data Dissemination System and the Special Data Dissemination Standard or any other suitable national good practices. These will allow improvement of:

- Dissemination guidelines
- Metadata
- Transparency.

⁷⁰ See examples of national climate change statistics reports on the Statistics Division website, at https://unstats.un.org/unsd/envstats/climatechange_reports.cshtml.

114. To facilitate access to the information, release calendars must show when information is expected to be made available to the public. The national institution mandated to produce climate change statistics can implement a publication dissemination protocol with a publicly accessible climate change information system.

115. Dissemination by all means, and by which data are made available to the public, includes:

- Formal hard-copy publications
- Electronic media
- Data provided on request
- Website
- Online database and data portal.

116. The periodicity of dissemination may vary from country to country and indicator to indicator. Accordingly, it may be daily, weekly, monthly, quarterly, by semester, annually or on an ad hoc basis.

117. Chapter 10 of the Handbook on Management and Organization of National Statistical Systems provides comprehensive guidelines on the dissemination of official statistics. In this phase of the statistical process, the data which have been collected and compiled are disseminated to the general public.

5.4. Evaluating contribution to national policy demands and international reporting requirements

118. Contributions and benefits of applying the Global Set will be reflected in the national communications and biennial reports for annex I parties; and national communications and biennial update reports for non-annex I parties, but mostly in the new biennial transparency reports under the Paris Agreement to be submitted from 2024.

119. While experiences in implementing the Global Set are evolving, one way to determine the usefulness of the indicators is through a user survey. In addition to ascertaining how the data are used and their efficacy, there may be opportunities to discover new data and data sources for future additions to the database. The use of a survey would help to ensure that the national statistical offices and agencies can keep up with the demands of a changing data environment, as it will reveal both what data users require and the emergence of new data users. Such a user survey would assess the trust placed in official statistics by the national statistical office, the usefulness of the statistics for policy monitoring in the country, and their completeness for reporting to international agencies and multilateral environmental agencies. One initiative used to assess the effectiveness of a climate statistics and indicators programme is the conduct of surveys of public awareness concerning potential climate change impacts on specific sectors, such as housing, agriculture and others.

120. Focus groups on specific topics offer another way of obtaining feedback from users of data. The review of data sets and indicators within these topics may need to assess compliance with new or amended policies, strategies and plans, and also to review new international data demands.

121. The assessment and implementation of the Global Set require a multi-annual plan or programme and will assist in mobilizing resources. These processes should therefore be included in the long-term plans and strategies of national statistical offices, UNFCCC-NFPs and other organizations involved. The evaluation of the

implementation plan will allow for review and optimization and should be an ongoing process depending on the following factors and processes:

- Improved knowledge and understanding of climate science, the direct and indirect impacts of climate change (supported by qualitative and quantitative evidence where possible)
- Changes in data and information
- Changes in data collection, management and storage of data
- Economic conditions and the availability of and access to funding mechanisms
- Changes in financial, technical and human resources
- Results from a monitoring and evaluation framework.

Annex II

Global Set of Climate Change Statistics and Indicators^a

This annex presents the Global Set with area, topic, indicator, statistic, tier,^b references to Paris Agreement articles and the Paris Agreement work programme-Katowice package, as defined above. In addition, as specified in paragraph 27 of the report of the Secretary-General, the main statistical references, including the internationally accepted frameworks, standards and guidelines, are presented in abbreviated form in the last column (entitled “Method”), as follows:

- IPCC: Intergovernmental Panel on Climate Change 2006 Guidelines (6 indicators and 4 statistics follow IPCC).
- FDES 2013: Framework for the Development of Environment Statistics and its Manual on the Basic Set of Environment Statistics (BSES) (10 indicators and 110 statistics follow FDES 2013, either verbatim, or in a “similar to” or “related to” manner).
- SDG: Sustainable Development Goal indicators metadata (43 indicators and 8 statistics match SDG indicators either verbatim, or in a “similar to” or “related to” manner)
- Sendai: Sendai Framework for Disaster Risk Reduction 2015–2030 (9 indicators and 3 statistics follow Sendai guidance).
- ECE: Conference of European Statisticians set of core climate change-related indicators metadata (25 indicators and 10 statistics match ECE indicators either verbatim, or in a “similar to” or “related to” manner).
- IRES: International Recommendations for Energy Statistics (7 indicators and 17 statistics follow IRES).
- SEEA-CF: System of Environmental-Economic Accounting Central Framework (10 indicators and 13 statistics follow SEEA-CF).
- SEEA-EA: System of Environmental-Economic Accounting Ecosystem Accounting (8 indicators and 15 statistics follow SEEA-EA).

^a Source: United Nations, Statistics Division, “Background document to the report of the Secretary-General on climate change statistics (E/CN.3/2022/17), Global Set and metadata”. Available at <https://unstats.un.org/unsd/statcom/53rd-session/documents/BG-3m-Globalsetandmetadata-E.pdf>.

^b Tier 1 indicators and statistics are shown in bold; tier 2 in normal text; tier 3 in italics (see para. 33 above).

Area/topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Drivers						
Total greenhouse gas emissions						
	1. Total greenhouse gas emissions per year		1	13.7a	Decision 18/CMA.1, chap. II, paras. 47–49	IPCC; SDG; ECE
		Total emissions of direct greenhouse gases (excluding land use, land-use change and forestry)	1	13.7a	Decision 18/CMA.1, chap. II, paras. 47–49	IPCC; FDES 2013
	2. Total emissions of indirect greenhouse gases		1	13.7a	Decision 18/CMA.1, chap. II, paras. 47–49	IPCC; FDES 2013
	3. Greenhouse gas emissions from land use, land-use change and forestry		1	13.7a	Decision 18/CMA.1, chap. II, paras. 47–49	IPCC; FDES 2013; ECE
	4. Total greenhouse gas emissions from the national economy		2			SEEA-CF; ECE
	5. Greenhouse gas emissions per capita		1			IPCC; FDES 2013
		Total emissions of direct greenhouse gases (excluding land use, land-use change and forestry)	1	13.7a	Decision 18/CMA.1, chap. II, paras. 47–49	IPCC; FDES 2013
	<i>6. Greenhouse gas emissions in gross fixed capital formation of direct investment</i>		3			SEEA-CF
	<i>7. Greenhouse gas emissions in value added of foreign-controlled multinational enterprises</i>		3			SEEA-CF
		<i>Greenhouse gas emissions in output of foreign-controlled multinational enterprises</i>	3			SEEA-CF
		<i>Greenhouse gas emissions in exports of foreign-controlled multinational enterprises</i>	3			SEEA-CF
	8. Carbon footprint		2			SEEA-CF; ECE
Atmospheric concentration of greenhouse gases						
	9. Global concentration of greenhouse gases		2			FDES 2013
Energy production, supply and consumption						
	10. Total primary energy production from fossil fuels		1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
		Total energy production	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; FDES 2013
	11. Total energy supply from fossil fuels		1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
		Total energy supply	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; FDES 2013; ECE
	12. Share of fossil fuels in total energy supply		2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	ECE
		Total energy supply from fossil fuels	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
		Total energy supply	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; FDES 2013; ECE

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Drivers						
Energy production, supply and consumption (continued)						
	13. Final energy consumption per capita		1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; ECE
		Final energy consumption	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; FDES 2013
	14. Energy intensity measured in terms of primary energy and gross domestic product		2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	SDG
		Total energy supply	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; FDES 2013; ECE
Fossil fuels						
	15. Fossil fuel dependency		3			IRES
		Fossil fuels production	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
		Fossil fuels imports	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
		Fossil fuels exports	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
	16. Amount of fossil fuel subsidies (production and consumption) per unit of gross domestic product		2			SDG; ECE
Population						
	17. Population growth		1			
		Population	1			
	18. Urban population as a proportion of total population		1			
		Population living in urban areas	1			FDES 2013
Transport						
	19. Number of (fossil-driven) vehicles per capita		2			
		Number of private and public vehicles	1			FDES 2013; SDG
	20. Vehicle miles travelled per capita		2			
		Vehicle miles travelled	2			SDG
Land and agriculture						
	21. Intensity of use of forest resources		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Timber resources: removals	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	22. Deforested area as a proportion of total forest area		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Area deforested	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Forest area: Total	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	23. Ratio of area of organic soils drained for agriculture to total area of organic soils		2	13.7a	Decision 18/CMA.1, chap. II	
		Area of organic soils drained for agriculture	2	13.7a	Decision 18/CMA.1, chap. II	
		Area of organic soils	2	13.7a	Decision 18/CMA.1, chap. II	

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Drivers						
Land and agriculture (continued)						
	24. Livestock units per agricultural area		2	13.7a	Decision 18/CMA.1, chap. II	
		Area under land-use categories [agriculture]	2	13.7a	Decision 18/CMA.1, chap. II	FDES 2013
		Number of live animals in livestock units	1	13.7a	Decision 18/CMA.1, chap. II	FDES 2013
	25. Use of nitrogen fertilizers per hectare of total agricultural area (cropland and pastures)		2	13.7a	Decision 18/CMA.1, chap. II	
		Chemical fertilizers	2	13.7a	Decision 18/CMA.1, chap. II	FDES 2013
		Area under land-use categories [agriculture]	2	13.7a	Decision 18/CMA.1, chap. II	FDES 2013
	26. Growth in built-up area		2			SEEA-CF
		Extent of urban sprawl	2			FDES 2013

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Impacts						
Agricultural production affected by climate change						
	27. Direct agricultural loss attributed to disasters		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai; SDG; ECE
	28. <i>Crop loss due to climate extremes</i>		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Crop yield	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	29. <i>Impact of climate change on livestock productivity</i>		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Livestock yield	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	30. Growing degree days		2			
		Daily average temperature	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Phenological stage	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
Areas affected by climate change						
	31. Forest area as a proportion of total land area		1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG; SEEA-CF
		Forest area: Total	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013; SEEA-CF
		Land area	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	32. Change in snow cover and snow depth		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Snow cover	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Snow depth	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	33. Reduction of surface water bodies		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Area under land cover categories [inland water bodies]	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	34. Change in coasts affected by erosion		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Coasts affected by erosion	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Coastal area	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		<i>Coasts affected by progradation</i>	3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	35. Reduction of the extent and mass of glaciers		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Extent of glaciers	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Mass of glaciers	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	

Area/topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Impacts						
Freshwater resources						
	36. Renewable freshwater resources per capita		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Precipitation	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Evapotranspiration	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Inflow	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	37. Freshwater abstracted as a proportion of renewable freshwater resources		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG; ECE
		Freshwater abstracted	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Renewable freshwater resources	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	38. <i>Water quality</i>		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Total suspended solids (TSS)	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		pH/acidity/alkalinity	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013; SDG
		Salinity	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Biochemical oxygen demand (BOD)	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Chemical oxygen demand (COD)	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Concentration level of chlorophyll A	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
Hazardous events and disasters						
	39. Frequency of hazardous events and disasters		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Occurrence of hazardous events and disasters	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Occurrence of extremes of temperatures and precipitation	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	ECE
	40. Direct economic loss to all other damaged or destroyed productive assets attributed to disasters		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai; SDG; FDES 2013
	41. Direct economic loss in the housing sector attributed to disasters		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai; SDG; FDES 2013
	42. Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population		1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai; SDG; FDES 2013; ECE
	43. <i>Number of climate refugees, climate migrants and persons displaced by climate change</i>		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Number of people whose destroyed dwellings were attributed to hydro-meteorological disasters	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	ECE; Sendai; FDES 2013

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Impacts						
Climate change and human health						
	44. Incidence of cases of climate-related diseases		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Airborne diseases and conditions	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Water-related diseases and conditions	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Incidence of climate-related vector-borne diseases	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013; ECE
	45. Incidence of heat- and cold-related illnesses or excess mortality		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Excess mortality related to heat	3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	ECE
		Excess mortality related to cold	3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	46. Climate induced air pollution		3			
		Concentration level of tropospheric ozone (O ₃)	2			FDES 2013
		Concentration level of particulate matter (PM _{2.5})	2			FDES 2013; SDG
Climate change evidence						
	47. Sea level rise		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Relative sea level	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	48. Reduction of sea ice cover		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Area of sea ice	3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	49. Average marine acidity (pH) measured at agreed suite of representative sampling stations		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		pH/acidity/alkalinity	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	50. Reduction of lake and river ice cover		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	51. Global mean surface temperature anomaly		2			
	52. Mean surface temperature anomaly		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	ECE
		Air temperature	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	53. Temperature records		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Cold nights	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Warm days	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Impacts						
Climate change evidence (continued)						
	54. Temperature-humidity index		1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Relative humidity	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Air temperature	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	55. Mean sea surface temperature anomaly		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Sea surface temperature	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	56. Ocean heat content		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	57. Temperature of freshwater bodies		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	58. Total rainfall anomaly		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Precipitation	1			FDES 2013
	59. Precipitation record		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Precipitation	1			FDES 2013
	60. Standardized precipitation index		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	ECE
		Precipitation	1			FDES 2013
Soil condition						
	61. Change of land area affected by soil erosion		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Area by soil types	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Area affected by soil erosion	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
Distribution and status of species						
	62. Proportion of populations maintained within species		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Species population	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	63. Red List index		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Number of Red List species	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	64. Species habitat index		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Area of ecosystems	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA; FDES 2013
		Known flora and fauna species	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Impacts						
Distribution and status of species (continued)						
	65. Rate of invasive alien species spread		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Invasive alien flora and fauna species	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
Distribution and status of ecosystems						
	66. Reduction in the extent of natural and semi-natural ecosystems		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA; ECE
		Area of ecosystems	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA; FDES 2013
		Expansion of built-up areas	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-CF; FDES 2013
		Expansion of agriculture areas	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-CF; FDES 2013
	67. Proportion of forest area affected by forest fires		1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Forest area affected by fire	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Forest area: Total	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	68. Phytosanitary status of forest		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Crown defoliation	3			
	69. Ecosystem integrity index		3			SEEA-EA
	70. Ecosystem connectivity		3			SEEA-EA
	71. Proportion of land that is degraded over total land area		1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Land area	1			FDES 2013
		Carbon stock in soil	3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA; ECE
		Land cover change resulting in land degradation	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA
		Land productivity [net primary production (NPP)]	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA
	72. Proportion of fish stocks within biologically sustainable levels		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
	73. Increase in area affected by coral bleaching		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA
		Area affected by coral bleaching	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
Production and consumption of materials						
	74. Impact on production of wood and non-wood products		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Non-wood forest products and other plants	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Impacts						
Climate change impacts on transport and critical infrastructure						
	75. Damage to critical infrastructure attributed to disasters		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai
	76. Direct economic loss resulting from damaged or destroyed critical infrastructure attributed to disasters		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai; SDG
	77. <i>Impacts of climate change on transport</i>		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Extent of roadways	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
Climate change impacts on tourism						
	78. <i>Reduction in tourist arrivals following climate-related hazardous events</i>		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Number of tourists (overnight visitors)	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	79. <i>Damage to natural heritage and sites of tourist interest</i>		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		<i>Number and description of natural heritage sites</i>	3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	80. Direct economic loss to cultural heritage damaged or destroyed attributed to disasters		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai; SDG

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Vulnerability						
Water security, food security and agriculture						
	81. Prevalence of undernourishment		2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		<i>Number, sex and age of undernourished people</i>	3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	82. Balance of food trade		2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Food production	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Food imports	1	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Food exports	1	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	83. Customer price of drinking water		2			
		<i>Price of water</i>	3			FDES 2013
	84. Water production cost		2			
	85. Area of biofuels (and other non-food crops) as a proportion of total agricultural area		3			
		<i>Area of biofuels production</i>	3			
		Area under land-use categories [agriculture]	2			FDES 2013
	86. Population relying on subsistence and pastoral farming		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		<i>Area of rain-fed agricultural systems</i>	3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Area under land-use categories [agriculture]	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
Vulnerable species, ecosystems and their services						
	87. Vulnerable species		3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Number of Red List species	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	88. Vulnerable or fragile ecosystems		3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA
		Red List of ecosystems	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	89. Vulnerable ecosystem services		3			
		Crop provisioning services	2			SEEA-EA
		Livestock provisioning services	2			SEEA-EA
		Water supply	2			SEEA-EA
	90. Ecosystem carbon stocks		2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA
		<i>Carbon stock in soil</i>	3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA; ECE
		Carbon stocks in biomass	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	IPCC; SEEA-EA; FDES 2013
		Forest biomass: Total	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013

Area/topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Vulnerability						
Buildings and infrastructure vulnerable to climate change						
	91. Infrastructure vulnerable to climate change		3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Hazard-prone areas	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Vulnerable/deteriorated infrastructure	3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	92. Buildings (settlements) vulnerable to climate change		3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Hazard-prone areas	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Number of dwellings with adequacy of building materials defined by national or local standards	3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
Vulnerable population						
	93. Coverage of essential health services		2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
	94. Net energy imports as a proportion of total energy supply		2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
		Imports of energy	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; FDES 2013
		Total energy supply	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; FDES 2013
	95. Proportion of population with access to electricity		1	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
	96. Proportion of population served by municipal waste collection		2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Population served by municipal waste collection	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	97. Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water		2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
	98. Proportion of population using safely managed drinking water services		2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Population using an improved drinking water source	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	99. Proportion of population with access to heating/cooling		3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Population with access to heating	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Population with access to cooling	3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
	100. Proportion of population living in coastal areas		2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Population living in coastal areas	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	101. Proportion of the population living below the international poverty line by sex, age, employment status and geographic location (urban/rural)		2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Vulnerability						
Vulnerable population (continued)						
	102. Proportion of population living in non-coastal hazard-prone areas		3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Population living in hazard-prone areas	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	103. Proportion of urban population living in slums, informal settlements or inadequate housing		2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Area of slums	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Population living in informal settlements	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	104. Indigenous population living in isolated areas		3			
		Number of indigenous persons	2			
	105. Proportion of population with disability		3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
Area of country vulnerable to climate change						
	106. Coastal area vulnerable to climate change		3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Coastal area	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Sea level rise	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	107. Islands vulnerable to climate change		3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Area of islands	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Sea level rise	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	108. Water bodies vulnerable to climate change impacts		3	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Area under land cover categories [inland water bodies]	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Groundwater stocks	2	7.1; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Mitigation						
Renewable energy						
	109. Production of renewable energy as a proportion of total energy production		2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
		Renewable energy production	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; FDES 2013
		Total energy production	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; FDES 2013
	110. Renewable energy share in the total final energy consumption		2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	SDG; ECE
		Renewable energy consumption	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
		Final energy consumption	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; FDES 2013
	111. Non-fossil fuel energy consumption as a proportion of final energy consumption		2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES; SDG
		Non-fossil fuel energy consumption	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
		Final energy consumption	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IRES
	112. Proportion of population with primary reliance on clean fuels and technology		2			SDG
	113. Rate of decrease of energy intensity		2			ECE
Climate change mitigation policies, strategies and plans						
	114. <i>Low-carbon development strategies and plans</i>		3	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	
		<i>List and description of strategies and plans</i>	3	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	
	115. Reforming or phasing out of government support for fossil fuels, by fuel type and type of support		2			
	116. <i>Share of climate change mitigation expenditure in relation to gross domestic product</i>		3	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	ECE
		Environmental protection expenditure	2			SEEA-CF; FDES 2013
	117. Share of energy- and transport-related taxes as a percentage of total taxes and social contributions		2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	SEEA-CF; ECE
		Energy and transport taxes	2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	SEEA-CF
		Total revenue from taxes and social contributions	2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	SEEA-CF
	118. Amounts provided and mobilized in United States dollars per year in relation to the continued existing collective mobilization goal of the \$100 billion commitment through to 2025		2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	SDG; ECE
		International financial flows for climate change responses	2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	SDG
	119. Average trading carbon price		2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	ECE

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Mitigation						
Climate change mitigation technology and practice						
	120. <i>Climate change mitigation technology</i>		3	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	
		<i>Number of hybrid and electric driven vehicles</i>	3			
		<i>Climate change mitigation patents</i>	2			
	121. Trade in low-carbon technology products		2	10	Decision 15/CMA.1	SEEA-CF
		<i>Total trade in low-carbon technology products</i>	2	10	Decision 15/CMA.1	SEEA-CF
		<i>Balance on trade in low-carbon technology products</i>	2	10	Decision 15/CMA.1	SEEA-CF
		<i>Exports of low-carbon technology products</i>	2	10	Decision 15/CMA.1	SEEA-CF
		<i>Imports of low-carbon technology products</i>	2	10	Decision 15/CMA.1	SEEA-CF
	122. Greenhouse gas intensity of the economy (including transport)		2			SEEA-CF; ECE
	123. Rate of decrease of greenhouse gas emissions per unit of gross domestic product		1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	IPCC
		Total emissions of direct greenhouse gases (excluding land use, land-use change and forestry)	1	13.7a	Decision 18/CMA.1, chap. II, paras. 47–49	IPCC; FDES 2013
	124. Greenhouse gas removals (carbon sequestration)		2	13.7a	Decision 18/CMA.1, chap. II, paras. 47–49	IPCC; FDES 2013; ECE
		<i>Greenhouse gas removals (carbon sequestration) by ecosystems</i>	2	13.7a	Decision 18/CMA.1, chap. II, paras. 47–49	SEEA-EA
		<i>Greenhouse gas removals by technological processes</i>	3	13.7a	Decision 18/CMA.1, chap. II, paras. 47–49	
	125. Increase in forest area		2	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	SEEA-CF; FDES 2013
		Forest area: Total	1	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	FDES 2013
	126. <i>Progress towards achieving the nationally determined contribution</i>		3	4.8; 4.13; 13.7b	Decision 18/CMA.1, chap. III; Decision 4/CMA.1	

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Adaptation						
Climate change adaptation policies, strategies and plans						
	127. Proportion of sectors planning, budgeting and implementing climate change adaptation actions		3	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		List and description of adaptation actions	3	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	128. Proportion of women in managerial positions		1	7.5	Decision 18/CMA.1, chap. IV	SDG
		Women's participation in sector-specific environmental governance bodies	3			
	129. Share of government adaptation expenditure in relation to gross domestic product		3	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	ECE
		Environmental protection expenditure	2			SEEA-CF; FDES 2013
	130. Number of units dedicated to climate change in government structures		3			
		List and description of units	3			FDES 2013
	131. National integrated coastal zone management		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Areas covered by integrated coastal zone management	3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	132. Fisheries management measures in place and multilateral/bilateral fisheries management arrangements		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
Risk management, disaster forecasting and early warning systems						
	133. Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies		2	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai; SDG
		Description of local disaster risk reduction strategies	2	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai; SDG
	134. Coverage of disaster shelters per capita		3	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Number of disaster shelters	3	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	135. Climate change funds received		3	13.10	Decision 18/CMA.1	
	136. Coverage of early warning systems		3	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai
		Existence and number of early warning systems	2	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	Sendai; FDES 2013
	137. Average increase of insurance premiums incurred due to climate change		3	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Insurance premiums incurred due to climate-related events	3	7.9; 7.10	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Adaptation						
Public awareness of and education on climate change						
	138. Proportion of population with access to climate information		3	12	Decision 17/CMA.1	
		Number of households with timely access to climate information	3			
		Number of people reached through climate change public awareness campaigns	3			
	139. Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment		2	12	Decision 17/CMA.1	SDG
		Number of children deprived of education	2			
	140. Number of companies publishing sustainability reports		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
	141. Number of reports on climate change statistics and indicators		3			
		List and description of climate change statistical products	3			
Area-based adaptation to climate change						
	142. Adaptation at coastal zones or river basins		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Area protected through storm surge infrastructure	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Area equipped with drainage systems	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
	143. Nature-based adaptation		3			SEEA-EA
		Area (length) of storm mitigation ecosystem services	2			SEEA-EA
		Area of coastal protection services	2			SEEA-EA
		Area of river flood mitigation services	2			SEEA-EA
	144. Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type		1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Key biodiversity areas	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Protected terrestrial and marine area	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	145. Share of green urban areas in the total area of cities		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	ECE; SDG
		Green urban area	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Total area of cities	2			FDES 2013

Area/topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Adaptation						
Area-based adaptation to climate change (continued)						
	146. Proportion of degraded area of ecosystems that has been restored		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA
		Area of restored ecosystems	3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SEEA-EA
	147. Buildings adapted to climate change		3	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Number of dwellings with adequacy of building materials defined by national or local standards	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	148. Proportion of agricultural area under productive and sustainable agriculture		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG; ECE
	149. Progress towards sustainable forest management		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
Climate change monitoring						
	150. Biodiversity information monitoring index		3			
		Number of species monitored	2			
	151. Meteorological monitoring network		3		Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Number and type of weather stations	3			
	152. Air quality monitoring systems		3		Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Number and type of air quality stations	3			
	153. Water monitoring systems		3		Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Number and type of hydrological monitoring stations	3			
	154. Ocean monitoring		3			
		Number and type of data buoys	3			
Water management						
	155. Water use per capita		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG; ECE
		Total freshwater available for use	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
Waste management						
	156. Municipal waste collected per capita		1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	
		Total amount of municipal waste collected	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
	157. Proportion of municipal waste treated		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Total amount of municipal waste collected	1	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Municipal waste managed in the country	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013

Area/ topic	Indicator	Statistic	Tier	Paris Agreement	Paris Agreement work programme-Katowice package	Method
Adaptation						
Waste management (continued)						
	158. Proportion of domestic and industrial wastewater flows safely treated		2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	SDG
		Total wastewater generated	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013
		Wastewater treated	2	7; 13.8	Decision 18/CMA.1, chap. IV; Decision 9/CMA.1	FDES 2013

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