# Climate change statistics at the global level

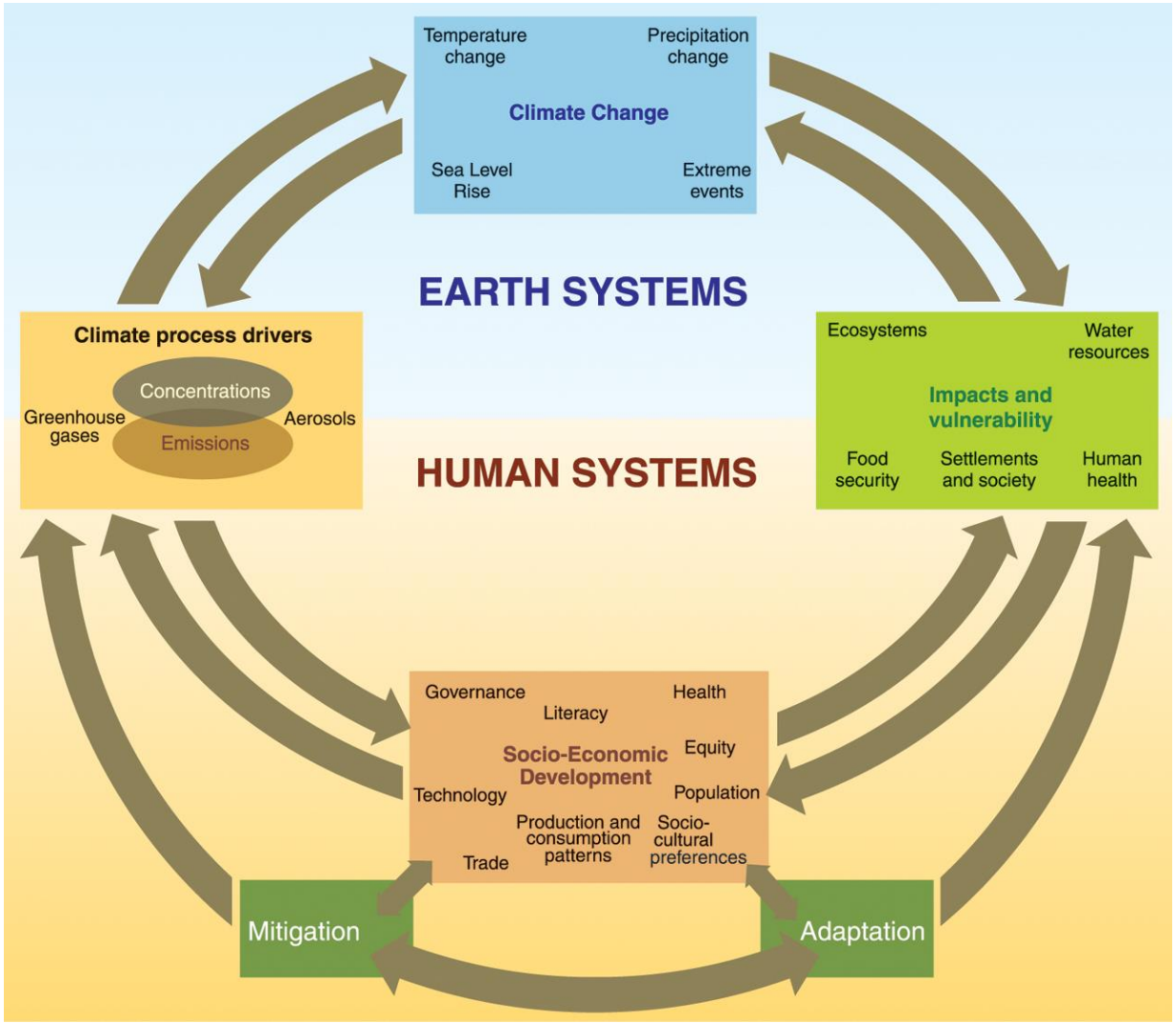
## Sixth Expert Group Meeting on Environment Statistics

(New York, 21-23 May 2019)

# UNSD past activities

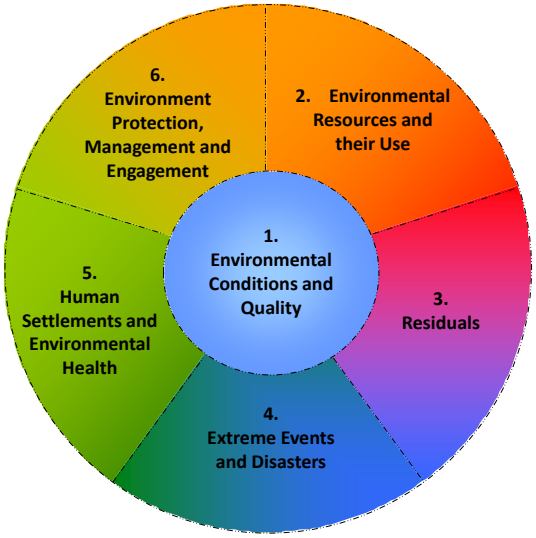
- At the Statistical Commission in 2009 a programme review on climate change and official statistics carried out by the Australian Bureau of Statistics was presented.
  - Specify how official statistics may be used for climate change measurement and analysis
  - Identify recommendations and actions to mainstream the climate change aspect in official statistics
- UNSD Conferences on climate change and official statistics
  - Oslo, 14-16 April 2008 (http://unstats.un.org/unsd/climate_change/default.htm)
  - Seoul, 11-12 December 2008 (http://unstats.un.org/unsd/climate_change/Korea/default.htm)
- No follow-up to the programme review was asked by the Statistical Commission in 2009.

# IPCC Framework




IPCC, 2007, Fourth Assessment Report

# FDES & climate change statistics




- FDES cross-cutting application (Chapter 5) links climate change and environment statistics based on IPCC Framework (4th report in 2007)
- Integrating official statistics for climate change monitoring

**Climate Process Drivers**

| Sub-component 1.3: Environmental Quality | Sub-component 3.1: Emissions to Air |
|---|---|
| 1.3.1 Air quality | 3.1.1 Emissions of greenhouse gases<br>3.1.2 Consumption of ozone depleting substances |

**Climate Change Evidence**

| Sub-comp. 1.1: Physical Conditions | Sub-comp. 4.1: Natural Extreme Events and Disasters |
|---|---|
| 1.1.1 Atmosphere, climate and weather<br>1.1.2 Hydrographical characteristics | 4.1.1 Occurrence of natural extreme events and disasters |

**Climate Change Impacts and Vulnerability**

| Sub-comp. 1.1: Physical Conditions | Sub-comp. 1.2: Land Cover, Ecosystems and Biodiversity | Sub-comp. 1.3: Environmental Quality | Sub-comp. 2.3: Land | Sub-comp. 4.1: Natural Extreme Events and Disasters | Sub-comp. 5.1: Human Settlements | Sub-comp. 5.2: Environmental Health |
|---|---|---|---|---|---|---|
| 1.1.2 Hydrographical characteristics<br>1.1.4 Soil characteristics | 1.2.1 Land cover<br>1.2.2 Ecosystems and biodiversity<br>1.2.3 Forests | 1.3.3 Marine water quality | 2.3.1 Land use | 4.1.2 Impact of natural extreme events and disasters | 5.1.3 Housing conditions | 5.2.3 Vector-borne diseases<br>5.2.4 Health problems associated with excessive UV radiation exposure |

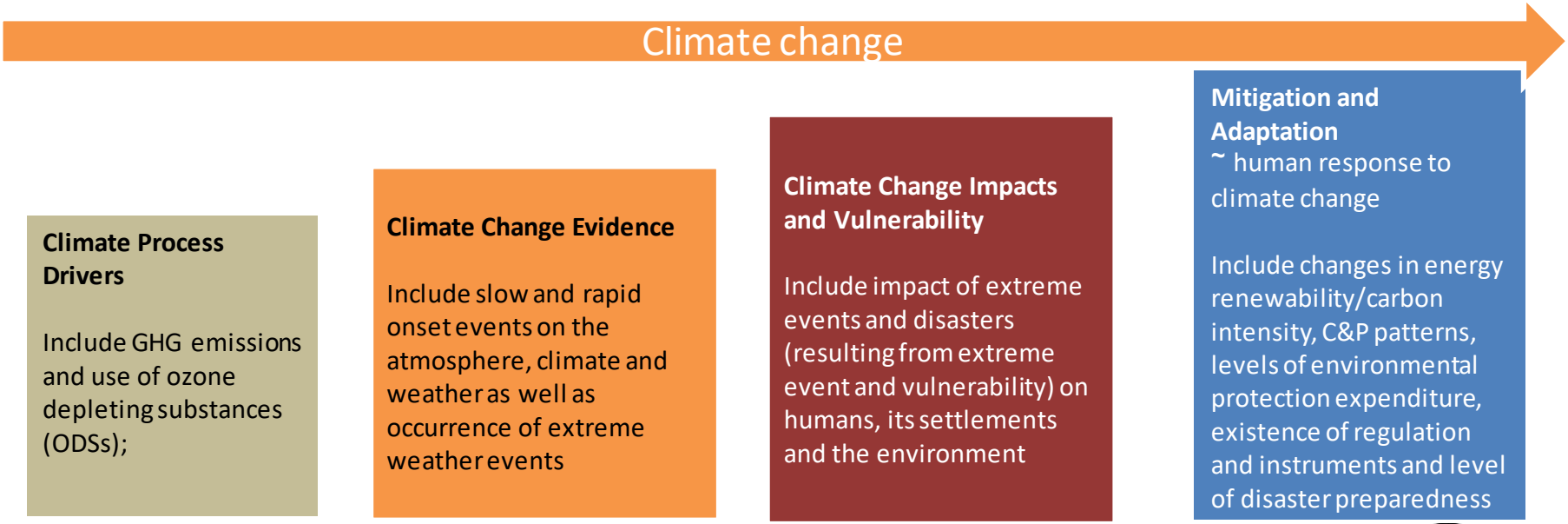
**Mitigation and Adaptation**

| Sub-comp. 2.2: Energy Resources | Sub-comp. 6.1: Environmental Protection and Resource Management Expenditure | Sub-comp. 6.2: Environmental Governance and Regulation | Sub-comp. 6.3: Extreme Ever Preparedness and Disaster Management |
|---|---|---|---|
| 2.2.2 Production, trade and consumption of energy | 6.1.1 Government environmental protection and resource management expenditure<br>6.1.2 Corporate, non-profit institution and household environmental protection and resource management expenditure | 6.2.2 Environmental regulation and instruments<br>6.2.3 Participation in MEAs and environmental conventions | 6.3.1 Preparedness for natural extreme events and disasters |

# IPCC sequence of climate change

The IPCC Framework (4th report in 2007) was the basis upon which the stages of the sequence of climate change were constructed to substantiate the application of the FDES to climate change statistics.

The FDES application to climate change statistics identifies the components, topics and individual statistics that are needed to inform about each of the stages of the sequence of climate change:



# State of statistics and guidance

- **Climate process drivers** - statistics relatively more available.
  - Greenhouse gas (GHG) emissions transform into global concentrations.
- **Climate change evidence** - statistics relatively more available.
  - Temperature and precipitation are available over long periods of time.
- **Climate change impacts** and **vulnerability** - some statistics are produced on impacts but more are needed. For vulnerability, need to develop methodologies and capacity.
  - Emerging data needs: Extreme climate-related meteorological events and natural disasters increase in frequency and intensity.
- **Mitigation** and **adaptation** statistics are less often produced and more difficult to capture statistically.
  - Insufficient resources for measurement and lack of guidance.
  - Adaptation statistics, while may be produced for particular sectors, need to be linked to climate change statistics.

# Report of the Secretary-General on Climate Change Statistics to the 47th session of the Statistical Commission

UNSD, in collaboration with UN-ECE, prepared the Report of the Secretary-General on Climate Change Statistics to the 47th session of the Statistical Commission (E/CN.3/2016/15) (New York, 8-10 March 2016).
http://unstats.un.org/unsd/environment/climatechange_docs_conf.html

**Decision 47/112:**
http://unstats.un.org/unsd/statcom/47th-session/documents/Report-on-the-47th-session-of-the-statistical-commission-E.pdf

**Main decisions:**
For countries: Use the FDES 2013 to guide the development of climate change statistics and indicators given the close interrelationship between environment statistics and climate change statistics.
For UNSD: Review and consider the set of climate change-related statistics and indicators of the Economic Commission for Europe as a basis for developing a global set of climate change statistics and indicators, applicable to countries at various stages of development.

# UNSD: Globalizing climate change statistics and indicators


The UN-ECE set of indicators was endorsed by the Conference of European Statisticians plenary session in June 2017 as an initial list.

**UNSD**:

- has pilot tested the UN-ECE set of indicators with countries and analyzed the responses to assess its applicability for developing countries, in particular to consider areas of concern such as adaptation/vulnerability.
- has discussed the set of indicators in various fora, including the Expert Group on Environment Statistics (EGES), and regional and national capacity building workshops.

EGES website: https://unstats.un.org/unsd/envstats/fdes/fdes_eges.cshtml

# UNSD Pilot Survey on Climate Change-related Statistics and Indicators - summary

- The UN-ECE set includes 39 indicators, grouped into five areas:

  Drivers – Emissions – Impacts – Mitigation – Adaptation

- **12** countries (11 developing and 1 developed), most of which are part of Expert Group on Environment Statistics (EGES), responded to Pilot Survey.

- The Pilot Survey contained 13 questions for the 39 indicators that were identical to those used by UN-ECE.
- UNSD has summarized responses to:

  *Question 1: Is this indicator available in your country? [Yes/No]*

  *Question 9: [If not] Which are the main problems in developing this indicator?*

  *Question 4.1: Is this indicator compiled by the NSO? [Yes/No]*

# Observations from the Pilot Survey and the EGES

- Methodological issues/Need clear definitions.
- Lack of technical capacity; constraint of human/financial resources.
- No policy framework.
- Specialized surveys needed/Lack of resources to conduct specialized surveys/Low survey response rates/Data quality issues.
- Lack of dedicated inter-institutional working group at national level focusing on climate change statistics.
- Some NSOs are highly involved in indicator compilation; others not.
- Several indicators not applicable/relevant (e.g., proportion of pop. living in dwellings with air conditioners or air conditioning), not available, not top priority, not significantly important, or too complex.
- Need to adjust indicators to reflect attribution and to include new sub-areas (such as oceans) or indicators which may be pertinent to developing countries, and to expand on areas such as adaptation which are of particular relevance to developing countries.
- Reporting methodologies, procedures and guidelines under negotiation at the UNFCCC.

# Pilot Survey – key points

Demonstrated the need to develop:

- New or additional indicators to reflect situation in developing countries.
- Process on how to identify/modify the indicators based on:

  - existing global processes (e.g., incorporating indicators identified in adaptation and mitigation plans being submitted to UNFCCC).

  -regional and national policies, priorities and processes.
- Systematic process for a full consultation at national level to involve all stakeholders.

# Report of the Secretary-General on Climate Change Statistics to the 49th session of the Statistical Commission

UNSD, in collaboration with UN-ECE and UNFCCC, prepared the Report of the Secretary-General on Climate Change Statistics to the 49th session of the Statistical Commission (E/CN.3/2018/14) (New York, 6-9 March 2018).
https://unstats.un.org/unsd/statcom/49th-session/documents/2018-14-ClimateChange-E.pdf

**Decision: 49/113**
https://unstats.un.org/unsd/statcom/49th-session/documents/Report-on-the-49th-session-E.pdf

**Main decisions**
For countries: (i) Participate in the Pilot Survey on Climate Change-related Statistics and Indicators currently being undertaken by UNSD, as well as in the planned Global Consultation on Climate Change Statistics and Indicators; (ii) Enhance collaboration between national statistical offices (NSOs) and national authorities responsible for reporting climate change related information to UNFCCC Secretariat;
For UNSD and UNFCCC: Strengthen the link between statistics and policy, for example, by: (i) undertaking joint initiatives in the development of climate change statistics and indicators; (ii) encouraging joint capacity building efforts and trainings with other partners, and exploring ways to encourage NSOs to be more involved in the preparation of data submissions to the UNFCCC secretariat, for supporting the implementation of the Paris Agreement.

# UNSD: Globalizing climate change statistics and indicators (current activities/plans)

**UNSD**:

- presented the SG's Report on Climate Change Statistics to the 49th session of the Statistical Commission (6-9 March 2018).
- has reviewed the UN-ECE and the IPCC/FDES frameworks and identified links to the Paris Agreement.
- is reviewing the UN-ECE list of indicators and consulting other lists (international organizations (UNFCCC, WMO, FAO), regional institutions (UNECE, ESCWA, ECLAC, OECD), research (IPCC) national agencies (US EPA, New Zealand EPA), national reports (National Adaptation Plans, National Communications) and NGOs (Climate Reality, World Resources Institute) with a view to developing a suitable list prior to the Global Consultation.
- is developing a work plan based on the list of planned activities contained in the SG's Report to the 49th session of the Stat. Commission.
- is planning to develop an inventory of related work on climate change statistics by partner organizations.
- is planning to conduct a Pilot Survey and the Global Consultation in 2019/2020.

# UNSD: Globalizing climate change statistics and indicators (current activities/plans)

To strengthen the link between statistics and policy, UNSD is engaging closely with UNFCCC to develop the global set of climate change statistics and indicators.

Some examples are:

- Joint report to the 49th session of the Stat. Commission (with UN-ECE)
- Joint Side Event at the 49th session of the Stat. Comm.
- Joint Side Event at the 50th session of the Stat. Comm.
- UNFCCC participates in the Expert Group on Environment Statistics
- UNSD participated in the UNFCCC-organized Workshop on national adaptation goals/indicators and their relationship with the SDGs and the Sendai Framework for Disaster Risk Reduction in Tokyo in July 2018.
- UNFCCC participated in the UNSD/UNEP/ESCWA workshop on environment statistics and information for the Arab region in Beirut in November 2018.

# 5th EGES meeting – key points on climate change

## Framework for Climate Change Statistics and Indicators:

Expert Group agreed to use the areas of the IPCC framework (drivers, impacts, vulnerability, mitigation, adaptation,) to structure the global set of statistics and indicators as it would create a direct link to international policy and reporting to UNFCCC through the Paris Agreement.

## Global Set of Climate Change Statistics and Indicators:

Expert Group agreed that indicators should be based on IPCC framework and linked to UNFCCC through the Paris Agreement to strengthen relationship between statistics and policy. The set of indicators should be limited in number to provide clear guidance for policy makers and encourage an inclusive and universal set applicable to all countries. It was agreed that a limited core set with additional indicators developed in a tiering system to cater to countries with different concerns, priorities and capabilities would be useful.

# 5th EGES meeting – key points on climate change

Role of National Statistical Offices (NSOs):

Expert Group discussed that existing structures in a country may provide an entry point and the NSO could become the national aggregator of the climate change information by mining National Communications reported to UNFCCC and putting them into context. The role of the NSO was seen as providing transparency and in raising awareness of climate change as an issue among a broad range of stakeholders. Expert Group discussed that NSOs could play a more active role in the national climate change committees.

Global Consultation on Climate Change Statistics and Indicators:

Expert Group discussed that the Global Consultation should take place in 2019-2020 and the results be ready prior to the Global Stocktake of the Paris Agreement (first one in 2023) to be available to collectively assess progress and implementation to address the information needs of the Global Stocktake. Guidance to implement the Transparency Framework of the Paris Agreement will most probably be finalized at the COP24 in Dec 2018. The implementation guidance is expected to shed more light on the data reporting requirements of the Paris Agreement, so exact dates of when to conduct the Consultation will be determined in due course.

# Towards the global set of climate change indicators

**(consulted sources to date)**

## International and Regional Sources

- IPCC Reports
- WMO
- ESCWA
- FAO
- FDES
- SDG Indicators
- SEEA
- ECE
- EEA
- Other Academic/NGO institutions or frameworks

## National Sources (from 103 ountries to date)

- State of environment reports
- UNFCCC National Communications
- National Adaptation Plans (NAPs)
- National environmental protection agencies
- Intended National Determined Contributions (INDCs)
- National Statistics Offices (NSOs)
- Ministry websites
  - Ministries of Environment
  - Ministries of Natural Resources
  - Ministries of Sustainable Development
  - Ministries of Energy
  - Bureaus of Meteorology

# Towards the global set of climate change indicators

**(consulted sources to date)**

Processing steps:

- The documents of the above sources were compiled.
- Key word search was conducted in the documents using predefined set of key words, for example:
  - Natural disasters, threatened species, forest area, emissions.
- Next, key words were grouped into common indicators and consolidated.
- Indicators were assigned to one (or more) of the five climate change areas (drivers, impacts, adaptation etc.).
- Counts of source indicators were automatically extracted so that each indicator can be assessed in terms of how many countries mentioned it and in how many sources.

# Towards the global set of climate change indicators

## (consulted 103 national sources to date)

# Towards the global set of climate change indicators

- In the growing list of climate change indicators, there are approximately 6,822 indicators sourced from countries, grouped into five areas (Drivers, Impacts, Mitigation, Adaptation, and Vulnerability) consisting of 150 indicators. Many of which are repeated across different countries and organizations.

- Indicators come from reports of M. of Env/NSOs, which contain country-relevant information, at least one national source has been taken from 103 countries. Besides, international and regional sources such as SDG indicators, FDES, IPCC reports and ECE have been taken into account to identify other key indicators.

- Most country-specific indicators come from State of Environment reports or UNFCCC National Communications/National Adaptation Plans. Data from ministries of energy, meteorology and natural resources also been considered.

- UNSD is identifying a list of the most commonly repeated indicators according to the five areas of IPCC framework promoting a bottom-up approach to the selection of indicators and will continue this compilation from more countries.

- Presented are the common indicators for Drivers-11, Impacts-12 indicators, Vulnerability-11, Mitigation-11 and Adaptation-12. The common indicators occur often and cover the majority of reported indicators extracted so far.

# Towards the global set of Driver Indicators (103 countries)

| Name of Indicator | Countries which have reported (Out of 103) | Number of Occurrences (multiple sources per country) |
|---|---|---|
| Area under Land Use | 83 | 268 |
| GHG emissions of production activities | 71 | 113 |
| Generation of Waste/Wastewater | 51 | 158 |
| Livestock Production | 34 | 39 |
| Emission of NMVOC | 29 | 29 |
| Number of Vehicles | 20 | 32 |
| Deforestation Rate | 14 | 15 |
| Energy Intensity of the Economy | 12 | 15 |
| Energy Consumption by Household/Capita | 12 | 15 |
| Total Energy Efficiency of the Economy | 10 | 10 |
| Emission of Hydrocarbons | 9 | 10 |

# Towards the global set of Impact Indicators (103 countries)

| Name of Indicator | Countries which have reported (Out of 103) | Number of Occurrences (multiple sources per country) |
|---|---|---|
| Anomalies in Precipitation | 62 | 86 |
| Changes in Agricultural Production | 54 | 79 |
| Sea level Rise | 49 | 56 |
| Occurrence of Drought | 47 | 58 |
| Mortality due to Water related Diseases and Conditions | 42 | 165 |
| Occurrence of Flood | 41 | 60 |
| Incidence / Number of Cases of Vector-Borne Diseases | 38 | 46 |
| Concentration of Nitrogen Oxides (NOx) | 34 | 42 |
| Concentration of Carbon Monoxide (CO) | 33 | 172 |
| Anomalies in Surface Air Temperature | 33 | 37 |
| Incidence / number of cases of Water related Diseases and Conditions | 31 | 33 |
| Incidence / number of cases of Airborne Diseases and Conditions | 24 | 25 |

# Towards the global set of Vulnerability Indicators (103 countries)

| Name of Indicator | Countries which have reported (Out of 103) | Number of Occurrences (multiple sources per country) |
|---|---|---|
| Threats to Crops and Vegetation | 39 | 62 |
| Affects on Fish Production | 28 | 47 |
| Water bodies - Lakes/Rivers | 15 | 27 |
| Distribution of Ecosystems | 14 | 16 |
| Various Risk Elements of Ecosystem | 14 | 26 |
| Vulnerability due to Exposure to various Elements | 14 | 24 |
| Population living in Slums | 13 | 14 |
| Population living below the Poverty Line | 10 | 10 |
| Mortality Rate | 10 | 11 |
| Climate Variability | 10 | 12 |
| Access to Health Care | 9 | 9 |

# Towards the global set of Mitigation Indicators (103 countries)

| Name of Indicator | Countries which have reported (Out of 103) | Number of Occurrences (multiple sources per country) |
|---|---|---|
| Increase in Forest Area | 51 | 81 |
| Use of Hydro Energy | 40 | 61 |
| Renewable Energy use in Overall Consumption | 39 | 47 |
| Measures of Development related to Mitigation | 39 | 84 |
| Progress towards Reducing GHG Emissions | 19 | 21 |
| Use of Solar Energy | 18 | 20 |
| Pro-Environment Activities and NGOs | 15 | 29 |
| Investments on Environmental Protection | 14 | 20 |
| List and Description of Green/Environmental taxes | 14 | 17 |
| Amount of Environmental Monitoring Measures | 14 | 18 |
| Environmental Engagement and Activities to Mitigate | 12 | 18 |

# Towards the global set of Adaptation Indicators (103 countries)

| Name of Indicator | Countries which have reported (Out of 103) | Number of Occurrences (multiple sources per country) |
|---|---|---|
| Use of Water Resources | 80 | 265 |
| Distribution & Status of Species | 52 | 95 |
| Area which is Protected | 44 | 66 |
| Use of Hydro Energy | 40 | 61 |
| Proportion of Buildings/Infrastructure Adhering to Climate-Change Standards | 28 | 57 |
| Recycling/ Reuse/ Use of Solid Waste | 27 | 35 |
| Utilization of Adaptive Agricultural Methods | 21 | 32 |
| Size of Environmental Monitoring Network | 21 | 28 |
| Population Accessibility to Water | 19 | 25 |
| Use of Solar Energy | 18 | 20 |
| National Climate Change Research and Education Programs or Measures | 14 | 15 |
| Measures of Cultural Sensitization or Knowledge to Environmental Issues | 13 | 14 |

# Further work on the global set of climate change indicators

- Continue compilation of indicators from more sources, refining of indicators and identification of common indicators.
- Review/compile metadata for the common indicators (maybe just Tier 1) to promote international applicability and harmonization.
- Continue to engage with UNFCCC and other partners to strengthen the link between statistics and policy, e.g., by: (i) undertaking joint initiatives in the development of climate change statistics and indicators; and (ii) encouraging joint capacity building efforts and training (e.g., UNFCCC participated in workshop on environment statistics and information for the Arab region).
- Ensure linkage of the work on the global set of indicators to:
  - the Adaptation Programme of UNFCCC (Article 7 - Paris Agreement);
  - the Global Stocktake of the Paris Agreement (Article 14); and
  - the Transparency Framework of the Paris Agreement (Article 13), based on the outcomes of the COP24 in Katowice.

# Further work on the global set of climate change indicators (contd)

- Develop and conduct a Pilot Survey to test the draft Global Set of Climate Change Statistics and Indicators (by end of 2019)
- Analyze results of Pilot Survey to develop survey for the Global Consultation (early 2020)
- Conduct Global Consultation with all Member States in 2020 and report to the Statistical Commission in 2021.
- The purpose of the Global Consultation, including that it is not intended to collect data, will be clearly explained to countries. It will also be stated in the Global Consultation that it is an indicator framework to assess primarily the relevance, methodological soundness and availability of indicators to derive a Global Set of Climate Change Statistics and Indicators, and not an additional reporting burden. The accompanying letter will include an introduction on why a set of climate change indicators is needed, i.e., that it has been requested from countries under the mandate of the Statistical Commission.
- A work plan outlining all the steps and activities will be developed by UNSD in collaboration with the Expert Group.