Global work on climate change statistics and indicators

Fifth Meeting of the Expert Group on Environment Statistics
(New York, 16-18 May 2018)

Environment Statistics Section, United Nations Statistics Division

United Nations Statistics Division

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.
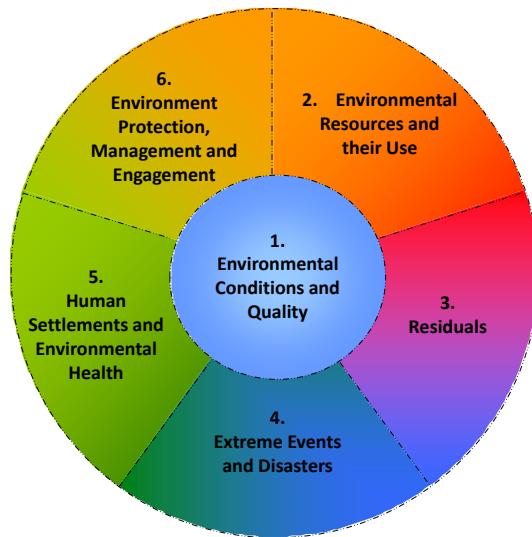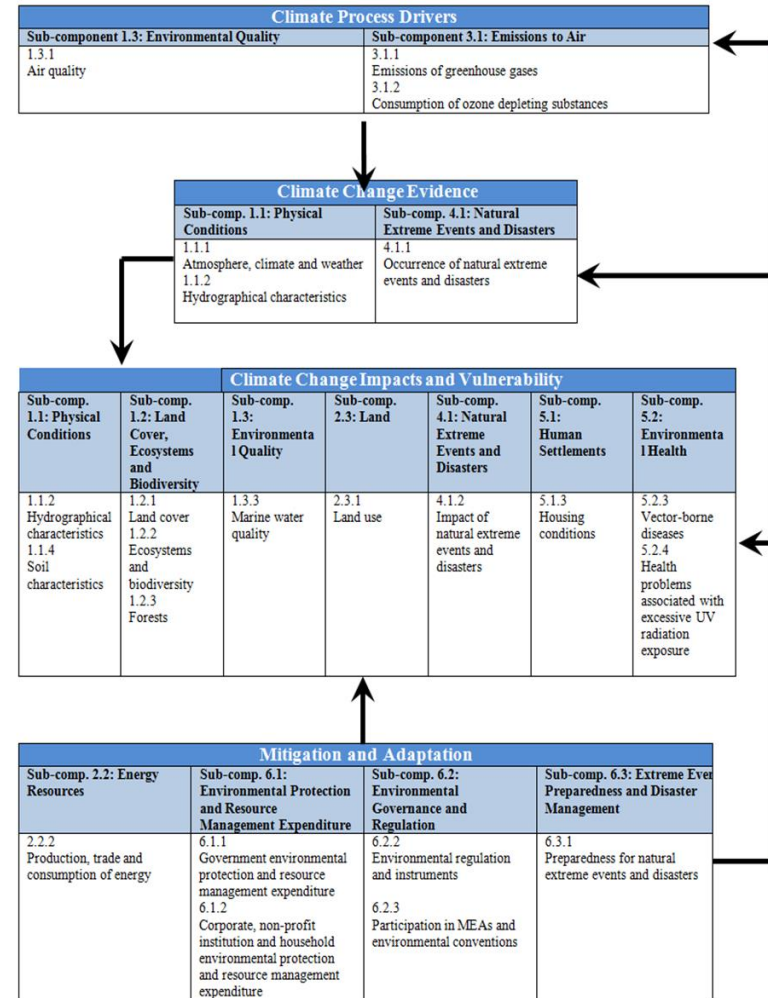
IPCC Framework
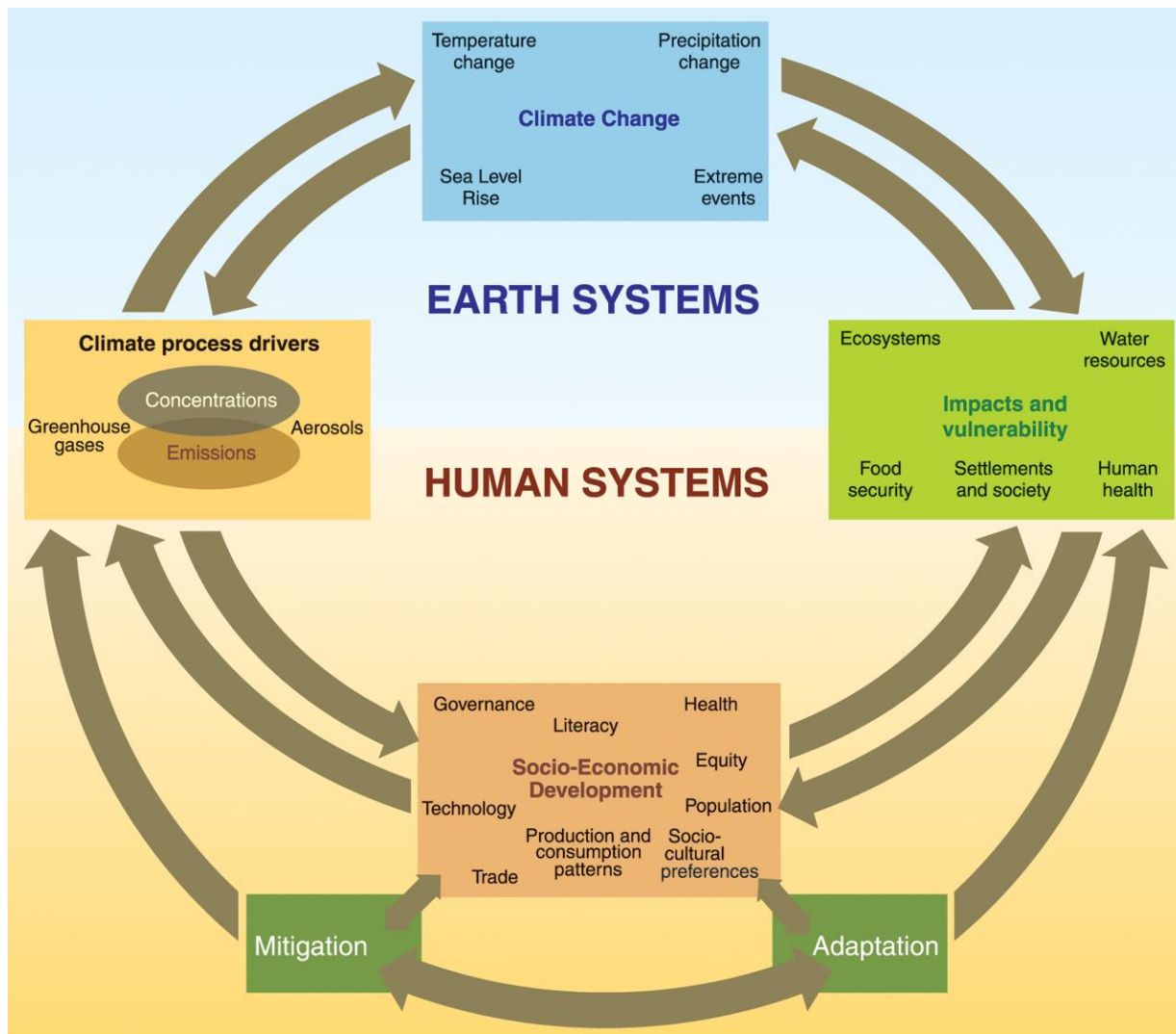
IPCC, 2007, Fourth Assessment Report
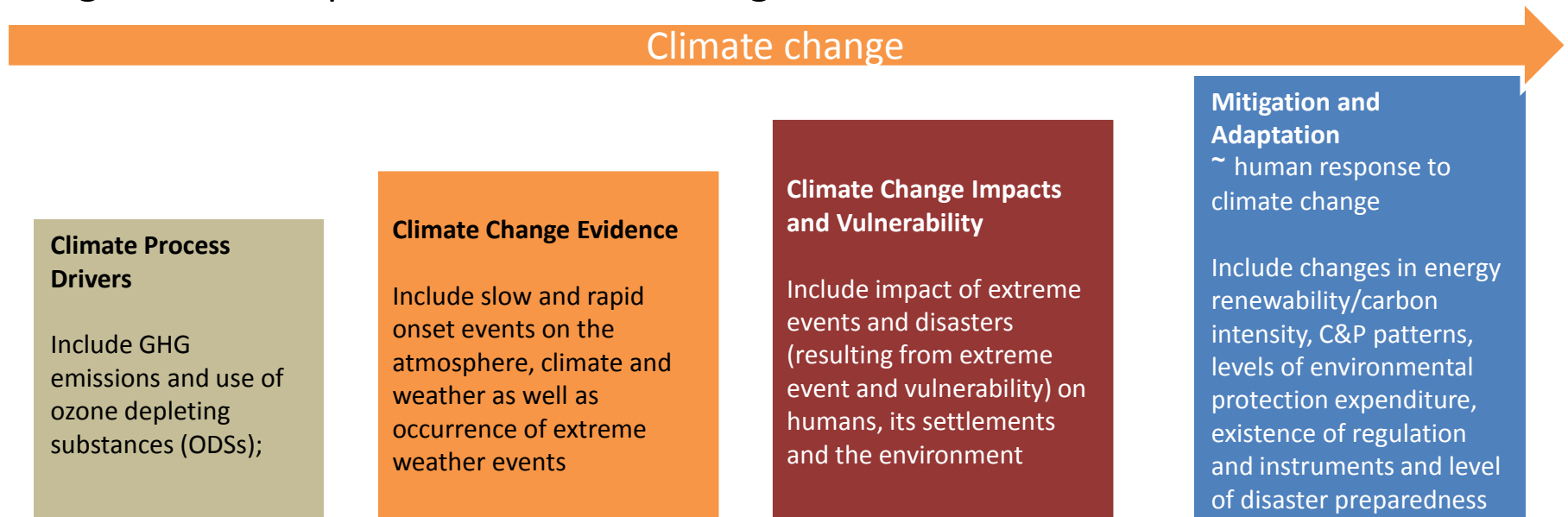
FDES & climate change statistics

- 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

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:

Climate change →

Climate Process Drivers

Include GHG emissions and use of ozone depleting substances (ODSs);

Climate Change Evidence

Include slow and rapid onset events on the atmosphere, climate and weather as well as occurrence of extreme weather events

Climate Change Impacts and Vulnerability

Include impact of extreme events and disasters (resulting from extreme event and vulnerability) on humans, its settlements and the environment

Mitigation and Adaptation
~ human response to climate change

Include changes in energy renewability/carbon intensity, C&P patterns, levels of environmental protection expenditure, existence of regulation and instruments and level of disaster preparedness
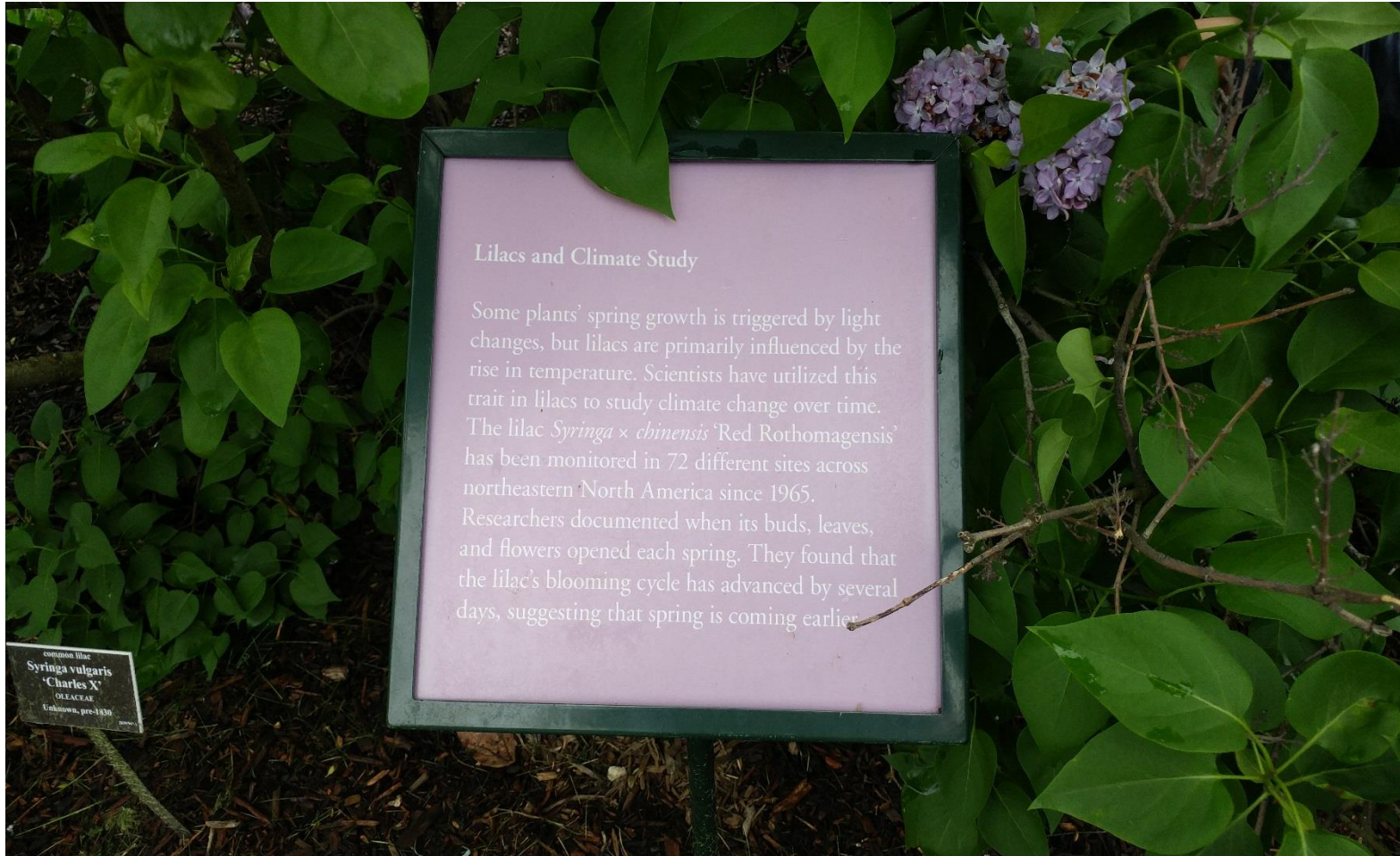
State of statistics and guidance

- **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.

Evidence of climate change – lilacs blooming earlier

Lilacs and climate study

UNSD recent activities

- Member of the UN-ECE Task Force on a set of key climate change-related statistics and indicators.
- Preparation, in collaboration with UN-ECE, of the Secretary-General's Report on Climate Change Statistics for the 47th session of the Statistical Commission in 2016 that focused on:
  - Demand and supply of climate change statistics
  - Statistical work on climate change in UNSD
  - Climate change-related statistics work in the Economic Commission for Europe
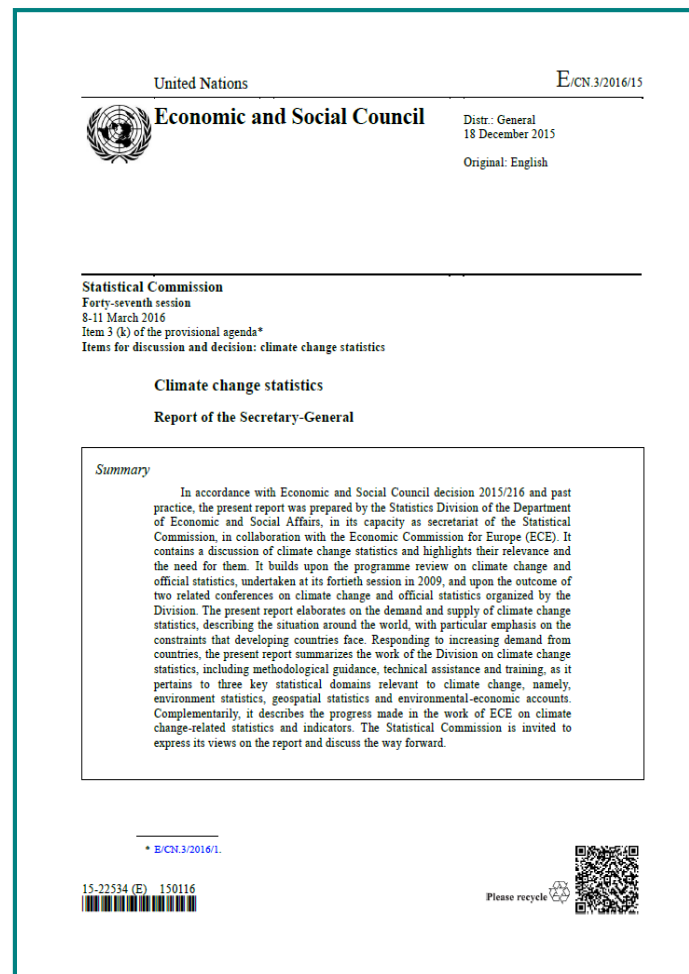 - The way forward

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), that was held in New York from 8 to 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

United Nations   E/CN.3/2016/15

Economic and Social Council

Distr.: General
18 December 2015

Original: English

Statistical Commission
Forty-seventh session
8-11 March 2016
Item 3 (k) of the provisional agenda*
Items for discussion and decision: climate change statistics

Climate change statistics

Report of the Secretary-General

Summary

    In accordance with Economic and Social Council decision 2015/216 and past practice, the present report was prepared by the Statistics Division of the Department of Economic and Social Affairs, in its capacity as secretariat of the Statistical Commission, in collaboration with the Economic Commission for Europe (ECE). It contains a discussion of climate change statistics and highlights their relevance and the need for them. It builds upon the programme review on climate change and official statistics, undertaken at its fortieth session in 2009, and upon the outcome of two related conferences on climate change and official statistics organized by the Division. The present report elaborates on the demand and supply of climate change statistics, describing the situation around the world, with particular emphasis on the constraints that developing countries face. Responding to increasing demand from countries, the present report summarizes the work of the Division on climate change statistics, including methodological guidance, technical assistance and training, as it pertains to three key statistical domains relevant to climate change, namely, environment statistics, geospatial statistics and environmental-economic accounts. Complementarily, it describes the progress made in the work of ECE on climate change-related statistics and indicators. The Statistical Commission is invited to express its views on the report and discuss the way forward.

* E/CN.3/2016/1.

15-22534 (E)   150116

Please recycle

47th session of Commission – Summary of decisions

- For countries:
  - Develop and strengthen environment statistics;
  - **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**; and
  - Invest adequate resources in the development of climate change statistics, in particular the underlying environment, energy, agriculture and industry statistics, and environmental-economic accounts that relate to the climate-economy interface and the physical flow accounts for greenhouse gas emissions.
- For the international statistical community:
  - Expand its regional, subregional and national capacity-building efforts in climate change statistics; and
  - Consider the Sendai Framework for Disaster Risk Reduction 2015-2030 in the development of climate change statistics and indicators.

United Nations Statistics Division

47th session of Commission – Summary of decisions

- 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**;
    - Include climate change statistics on the multi-year programme of the Statistical Commission with greater frequency; and
    - Develop a workplan for submission to the Commission at its forty-eighth session.

UNSD: Globalizing climate change statistics and indicators

Mandate by Statistical Commission

2017/2018

Submission of SG Report on Climate Change Statistics to Statistical Commission

2018/2019

Submission of a list of indicators to the Commission

2016

UNSD Pilot Testing

2018

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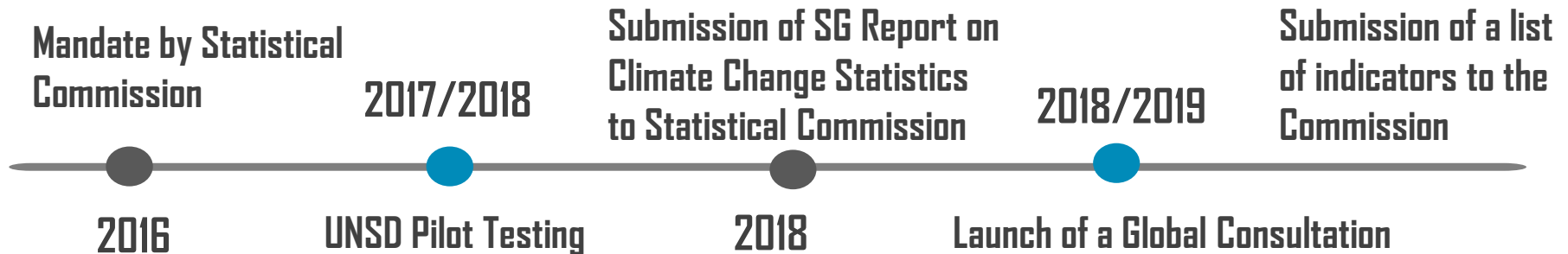
The UN-ECE set of indicators was endorsed by the Conference of European Statisticians plenary session in June 2017 as an initial list.

UNSD:

- is pilot testing the UN-ECE set of indicators with countries and analyzing the responses to assess its applicability for developing countries, in particular to consider areas of concern such as adaptation/vulnerability.

- is discussing the set of indicators in various fora, including the Expert Group on Environment Statistics (EGES), and regional and national capacity building workshops.

UNSD: Globalizing climate change statistics and indicators (contd)

UNSD:

- presented the SG's Report on Climate Change Statistics to the 49th session of the Statistical Commission (6-9 March 2018).

- is reviewing the UN-ECE and the IPCC/FDES frameworks and identifying 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 Reports, 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 Statistical Commission.

- is planning to develop an inventory of related work on climate change statistics by partner organizations.

- is planning to conduct the Global Consultation in 2018/2019.

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), that was held in New York from 6 to 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-draft-E.pdf

49th session of Commission - Summary of decisions

- For countries:
  - Participate in the Pilot Survey on Climate Change-related Statistics and Indicators currently being undertaken by the Statistics Division, as well as in the planned **Global Consultation on Climate Change Statistics and Indicators**;
  - **Enhance collaboration between national statistical offices and national authorities responsible for reporting climate change related information to UNFCCC Secretariat**;
  - Invest in the development of climate change statistics, in particular the underlying environment, energy, agriculture and industry statistics, given the expected increased and possibly more diverse data requirements for the implementation of the Paris Agreement.

- For UNSD:
  - Develop a work plan based on the list of activities presented in the Secretary-General's report to and endorsed by the Statistical Commission;
  - Expand the mandate of the Expert Group on Environment Statistics to cover more aspects of climate change statistics and indicators and to contribute to the development of the workplan.

49th session of Commission - Summary of decisions (contd)

- For UNSD and UNFCCC:
  - **Strengthen the link between statistics and policy**, for example, by:
    - undertaking joint initiatives in the development of climate change statistics and indicators,
    - encouraging joint capacity building efforts and trainings with other partners, and
    - **exploring ways to encourage national statistical offices to be more involved in the preparation of data submissions to the UNFCCC secretariat, for supporting the implementation of the Paris Agreement**.

- For UNSD and UNECE:
  - Continue to harmonize and coordinate efforts in terms of methodological work and the development of indicators.

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]

Is this indicator available in your country? [Yes/No]

Q1

United Nations Statistics Division

Pilot Survey (Q1)
Data availability per Area and Indicator

**Drivers
8**

63%
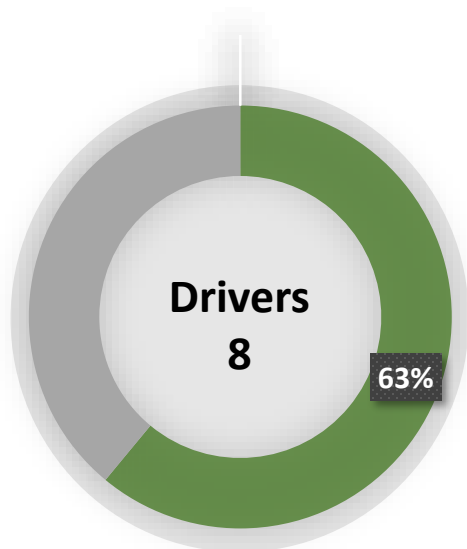
Total primary energy supply (TPES)	**100%**
Share of fossil fuels in total primary energy supply (TPES)	**100%**
Losses of land covered by (semi-) natural vegetation	58%
Total support for fossil fuels / GDP	33%
Total energy intensity of production activities	67%
CO_2 intensity of energy for the economy	33%
Emission intensity of agricultural commodities	25%
Energy consumption by households / capita	83%

Percentages should be treated with caution as metadata may not have been fully followed

Discussion: Example of Energy Consumption by Households/capita

SEEA: Energy consumption by households per capita 🔍

Definition: Total amount of energy directly used by households (for all purposes **including transport**), divided by **resident population**.

Data Source: DUAL. SEEA-CF 3.4
Methodology: Final energy use by households per resident population

Note: If the data source are energy statistics or energy balances, then **the energy consumption of transport by households needs to be added**

|	A	B	C
1	**Indicator**		
2		Number	*8*
3		Name	***Energy consumption by households per capita***
4	**Versioning**		
5		First publication	*26-Jan-17*
6		Last update	
7	**Area and subarea**		
8		Area	*Drivers*
9		Subarea	*Consumption*
10	**Presentation**		
11		Tier	*I*
12		Indicator definition and description	*Total amount of energy directly used by households (for all purposes including transport), divided by resident population*
13		Unit of measure	*GJ pe rperson or kg oil equivalent per person*
14		Classification systems	*SEEA Physical Flow Accounts/Eurostat Energy Accounts*
15		Coverage	*Household's consumption*
16		Spatial aggregation	*National*
17		Reference period	*Calendar year*
18		Update frequency	*Annual*
19		Base period	*Not applicable*
20		Related operational indicators	*[follow-up work needed]*
21		Related contextual indicators	*Indirect energy consumption used by households per capita (although overlaps the scope of the carbon footprint indicator)*
22	**Relevance**		
23		Policy context and targets	*General context: structure of energy sector, sustainable consumption*
24		Link to SDGs (target and indicator)	*Target 7.3: By 2030, double the global rate of improvement in energy efficiency* *No indicator in the SDG framework related to energy consumption by households*
25		Link to Sendai Framework (target and indicator)	*Not applicable*
26		Other	*[to be completed]*
27		Policy references	*[to be completed]*
28	**Methodology**		
29		Methodology for indicator calculation	*Final energy use by households per resident population*
30		Methodology references	*Draft SEEA Energy: http://unstats.un.org/unsd/envaccounting/ceea/meetings/eleventh_meeting/BK-11-3c-3.pdf* *International Recommendations for Energy Statistics (IRES): http://unstats.un.org/unsd/energy/ires/IRES_edited2.pdf* *Eurostat: PEFA (Physical Flow Accounts for Energy) http://ec.europa.eu/eurostat/web/environment/methodology*

Pilot Survey (Q1)
Data availability per Area and Indicator
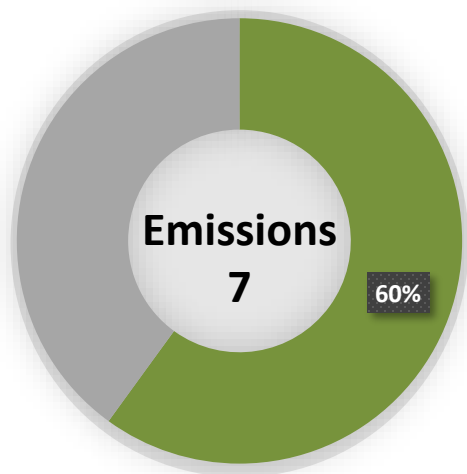
Total GHG emissions	**92%**
CO$_2$ emissions from fuel combustion	**92%**
GHG emissions from land use	75%
Total GHG emissions of production activities	58%
GHG emission intensity of production activities	50%
Direct GHG emissions from households	25%
Carbon footprint	25%

Emissions 7 — 60%

Tiering system does not always correspond to data availability.
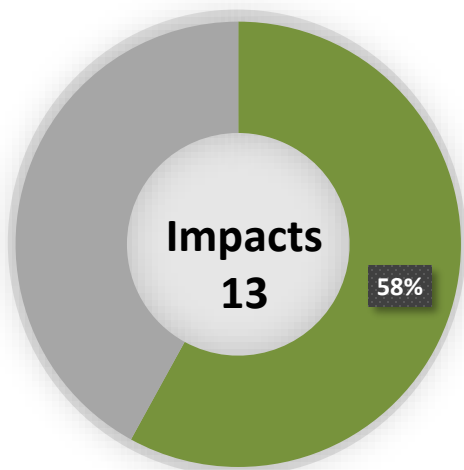
Annual average surface temperature	**92%**
Percentage of land area suffering from unusual wet or dry conditions (Standard Precipitation Index)	33%
Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	42%
Cumulative number of alien species	67%
Carbon stock in soil	25%
Proportion of land that is degraded over total land area	33%
Number of deaths and missing persons attributed to hydro-meteorological disasters, per 100,000 population	83%
Occurrence of extreme weather events	83%
Direct economic loss attributed to hydro-meteorological disasters in relation to GDP	58%
Number of people whose destroyed dwellings were attributed to hydro-meteorological disasters	75%
Distribution of cases of vector-borne diseases	75%
Heat-related mortality	17%
Direct agricultural loss attributed to hydro-meteorological disasters	67%

Impacts 13 — 58%

Pilot Survey (Q1) Data availability per Area and Indicator

Mitigation 6 — 29%
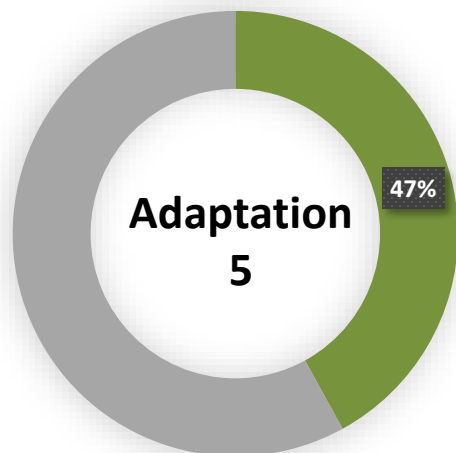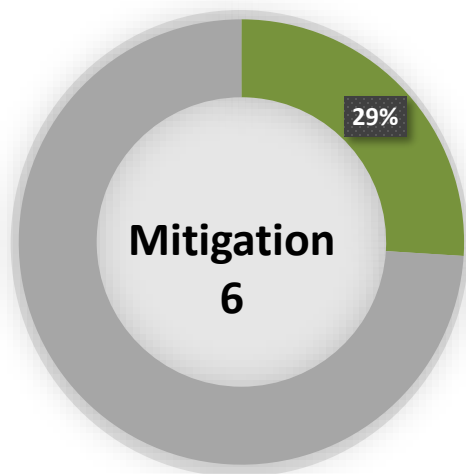
Indicator	%
Renewable energy share in the total final energy consumption	**92%**
Share of climate change mitigation expenditure relative to GDP	25%
Share of energy and transport related taxes as percentage of total taxes and social contributions	33%
Total climate change related subsidies and similar transfers/GDP	**8%**
Average carbon price	17%
Mobilized amount of USD per year starting in 2020 accountable towards the USD 100 billion commitment	**0%**

Adaptation 5 — 47%

Indicator	%
Share of government adaptation expenditure to GDP	33%
Change in water use efficiency over time	25%
Proportion of population living in dwellings with air conditioners or air conditioning	58%
Progress towards sustainable forest management	58%
Proportion of agricultural area under productive and sustainable agriculture	58%

Pilot Survey (Q1) Data availability per Area and Indicator

Discussion

Some Tier 1 indicators have data availability below 30% and some Tier 3 indicators has data availability over 80%. Should the Tiering system be revised?

Tier 1

Direct GHG emissions from households, 25%

Average carbon price, 17%

Tier 3

Number of deaths and missing persons attributed to hydro-meteorological disasters, per 100,000 population, 83%

Problems in developing the indicators per area

Pilot Survey (Q9)
Problems in developing the indicators per area

1- Drivers

- No measuring of land by natural vegetation. Difficult to monitor.
- Lack of funding for surveys. Financial constraints.
- Non-response to data requests.
- Data not available.
- Were never considered as indicators to be developed.
- Some of the indicators are not calculated (e.g., total energy intensity of production activities, CO_2 intensity of energy for the economy, and energy consumption by households/capita).
- Lack of technical capacity and human resources.
- No policy framework.
- No disaggregated emissions data according to ISIC.
- Not ready yet for doing environmental accounting, due to the many data gaps even for national accounts/GDP.
- Lack of definition. Should have a consistent calculation and data methodology. Methods and framework for the indicator are still under development.
- Sourced from various government institutions.

Pilot Survey (Q9)
Problems in developing the indicators per area

2. Emissions

- Data not available for some indicators (e.g., GHG emissions from land use, direct GHG emissions from households, and carbon footprint).
- Lack of technical capacity and resources.
- Lack of disaggregated data (production, activities according to ISIC, households).
- Methodological issues (no expertise, complex indicator).
- Not top priority.
- SEEA air emissions account is currently only available on a territorial basis.

3. Impacts

- Other stakeholders need to get involved in calculating indicators (e.g., percentage of land area suffering from unusual wet or dry conditions). Complicated calculations (using GIS maps, the land balance sheet).
- No current measuring or recording. Lack of a national monitoring programme.
- Data not available/Inadequate data/Data only available on national level with use of satellite images.
- Lack of data about water abstraction for some major sectors as construction and non-irrigated agriculture. Getting data of sufficient quality is a limitation.
- Lack of resources and capacity. Specialized surveys needed.
- Not relevant/No significant importance to their natural conditions.
- No official concept of degraded land. As the SEEA program is in its early phases no data on the land degradation has been integrated with the land cover account.
- Not all events can be captured.
- Sourced from various government institutions.

Pilot Survey (Q9)
Problems in developing the indicators per area

4- Mitigation

- Data availability.
- No systematic surveys.
- Not measured or calculated.
- Sourced from various government institutions.
- Low response rate for some data.
- Lack of technical and financial resources.
- Not ready yet for doing environmental accounting, due to the many data gaps even for national accounts/GDP.
- No carbon credits traded/No data on the price of carbon.
- Methodological issues (e.g., the Mobilized amount of USD per year starting in 2020 accountable towards the USD 100 billion commitment). [There is no internationally agreement on methodology for this indicator.]
- Social contributions are not collected.
- No policy framework.
- Lack of capacity building.
- Standard international guidelines, not clear if it is consistent with COFOG.
- Reporting methodologies, procedures and guidelines under negotiation at the UNFCCC.

Pilot Survey (Q9)
Problems in developing the indicators in each area

5. Adaptation

- Data availability.
- No systematic survey.
- Reliable data on the breakdown of use by sector needed.
- Not easy to measure. Needs clear compilation guidelines.
- Not relevant.
- Lack of funding for surveys.
- Funding, data collection and validation.
- Non-response to data requests.
- Lack of manpower.
- Lack of data collection for surface water. Lack of data on water use and getting data of sufficient quality is a main limitation.
- No policy framework.
- Lack of capacity building.
- Not currently calculated.
- Need for clear definitions for productive and sustainable agriculture.
- Standard international guidelines, not clear if it is consistent with COFOG.
- Not sure if there is need for some indicators, e.g. Proportion of population living in dwellings with air conditioners or air conditioning. Information on ventilation/healthy homes is more significant.
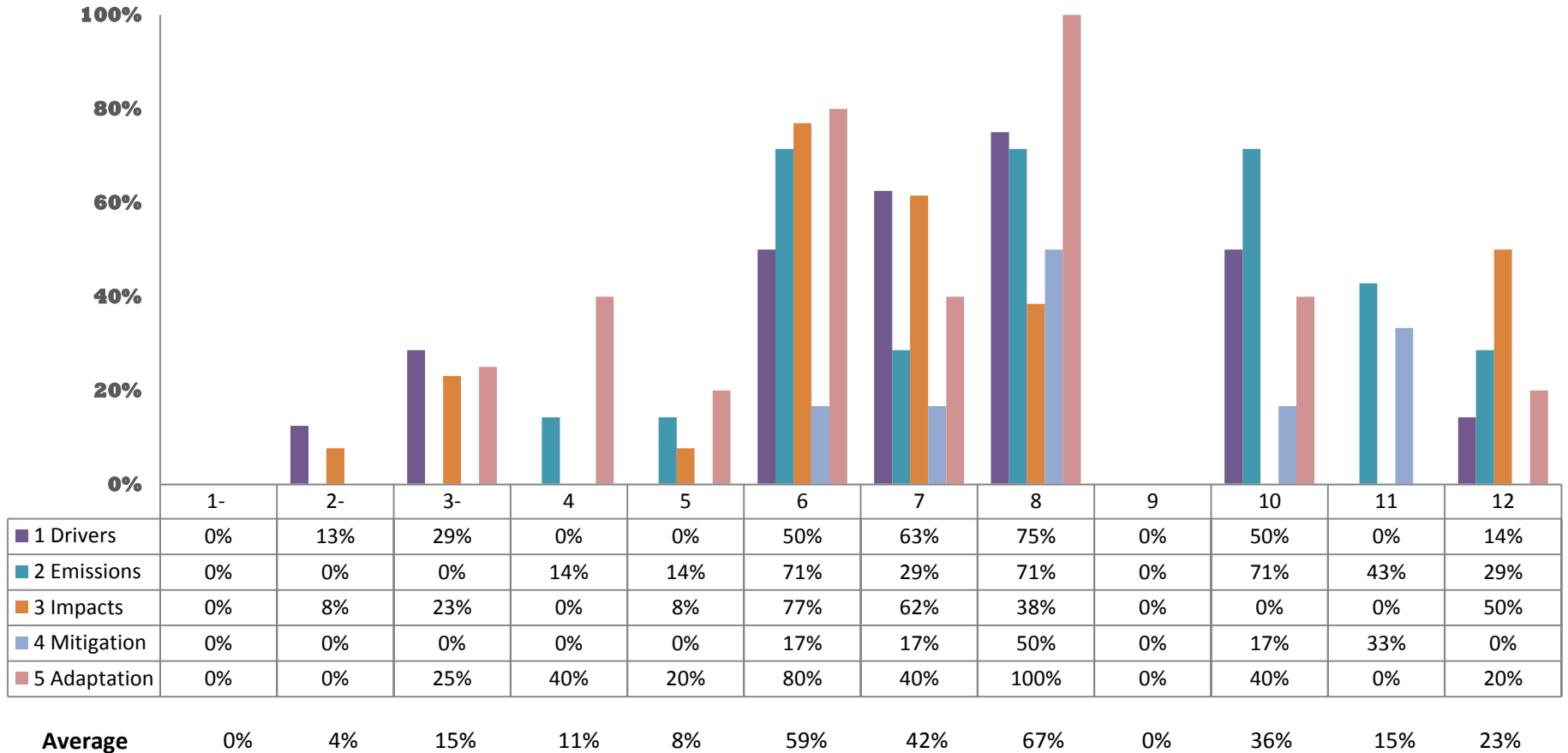
Q4

Is this indicator compiled by the NSO? [Yes/No]

Pilot Survey (Q 4.1)
If the indicator is compiled by the NSO

	1-	2-	3-	4	5	6	7	8	9	10	11	12
■ 1 Drivers	0%	13%	29%	0%	0%	50%	63%	75%	0%	50%	0%	14%
■ 2 Emissions	0%	0%	0%	14%	14%	71%	29%	71%	0%	71%	43%	29%
■ 3 Impacts	0%	8%	23%	0%	8%	77%	62%	38%	0%	0%	0%	50%
■ 4 Mitigation	0%	0%	0%	0%	0%	17%	17%	50%	0%	17%	33%	0%
■ 5 Adaptation	0%	0%	25%	40%	20%	80%	40%	100%	0%	40%	0%	20%
Average	0%	4%	15%	11%	8%	59%	42%	67%	0%	36%	15%	23%

Discussion	Some NSOs are highly involved in indicator compilation.
Discussion	Some NSOs are not involved in indicator compilation.

Pilot Survey (Q 4.1) Is this indicator compiled by the NSO

Discussion

Roles of NSOs in climate change statistics

Discussion

Difference between data collection/ data compilation? – can lead to different results

Discussion

If there's no official data (only data from research/university), how should this be dealt it?

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.

Indicators mentioned by the Pilot Survey and Expert Group on Environment Statistics (EGES)

[subject to review by UNSD and further discussion by EGES]

(existing 5 areas)

Drivers	**Emissions**
- Area under crop (expansion of cropping areas) - Number of livestock	 - Emissions from transport

Impacts
- Number of people injured
- Infrastructure destroyed (roads; dwelling units; bridges)
- Water quality
- Distribution of water-borne diseases
- Ocean acidification

- Number of displaced persons
- Infrastructure with building codes/standards (climate resilient buildings)
- Freshwater ecosystem extent
- Sea-level rise/coastal erosion (% change in coastal areas lost)

Mitigation	**Adaptation**
- Number of policies related to climate change - Quality of livestock feed - Carbon sequestration and coastal protection by mangroves (% change in mangrove forests) - Investment in environmentally sound technology	 - Percentage of coastline protected

Indicators mentioned by the Pilot Survey and Expert Group on Environment Statistics (EGES)

[subject to review by UNSD and further discussion by EGES]

additional area/sub-areas/combined areas (e.g. vulnerability and impacts)

Vulnerability or Adaptation
- Access to Extension Services
- Market access and Agricultural Commodity Prices
- Livelihoods Based Coping Strategies
- Gender mainstreaming
- Crop and livestock production
- Incomes and Expenditure by households and per capita
- Community Health Services

Vulnerability
- Proportion of population below the national poverty line
- Population making a living from agriculture and marine resources
- Pastoralist or nomadic pastoralist population
- Population living within 100km of coastline
- Population living in drought or flood prone areas
- Population engaged in subsistence agriculture and fisheries
- Access to improved water sources
- Time spent obtaining water by gender
- Population living in areas below 5m above sea level

Other (indicators not yet categorized into one of the five areas)
- Change in consumption of ODS
- Incidence of drought
- Percentage of fires that are forest fires
- Use of water for irrigation
- % population in coastal areas (change)
- % population in hazardous areas
- % of population that believe in CC
- Sea level rise
- Rate of loss of forest
- Change in area irrigated
- Area of wetlands/ecosystems to total land area/change in area of wetlands
- Urban/rural population
- Perception of climate change and knowledge of climate change

Observations from the Pilot Survey and the EGES

- Issues with disaggregation of data.
- Methodological issues/Need clear definitions.
- Lack of technical capacity and human resources.
- Financial and time constraints.
- 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.
- Other stakeholders need to get involved in calculating indicators (e.g., percentage of land area suffering from unusual wet or dry conditions).
- Several indicators are not applicable/relevant (e.g., no carbon credits traded, proportion of population living in dwellings with air conditioners or air conditioning), not available, not top priority, not significantly important, or too complex.
- Consideration of a core set of indicators plus complementary indicators to cover issues specific to certain regions and where data availability may be low.

Observations from the Pilot Survey and the EGES

- 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.

- Some countries are not ready yet for doing environmental accounting, due to the many data gaps for national accounts/GDP.

- SEEA air emissions account is currently only available on a territorial basis.

- No official concept of degraded land. As the SEEA program is in its early phases no data on the land degradation has been integrated with the land cover account.

- Reporting methodologies, procedures and guidelines under negotiation at the UNFCCC.

Thank you