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Items 1 and 2 of the provisional agenda

**Revision of biodiversity indicators and implementation of
recommendations on energy indicators****Recommendations for revising the ECE set of environmental
indicators: Energy and Biodiversity****Note by the secretariat¹***Summary*

At its twelfth session (Geneva, 17-18 November 2016), the Joint Task Force on Environmental Statistics and Indicators requested the secretariat to prepare for its next session a proposal on how to review its set of environmental indicators associated with energy and biodiversity (ECE/CEP-CES/GE.1/2016/12). The revised indicators are to be integrated into the ECE Online Guidelines for the Application of Environmental Indicators.

The present paper contains the secretariat's analysis of its energy- and biodiversity-related indicators, including suggestions for possible amendments its production tables. The Joint Task Force will be invited to consider the secretariat's proposal for the revised indicators with a view to deciding on the appropriate approach to be taken. If approved, the revised ECE set of environmental indicators are to be used in the preparation of the mid-term progress report on the establishment on SEIS in Europe and Central Asia.

¹ The present document was submitted late due to resources constraints.



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I. Introduction

1. At the twelfth session of the Joint Task Force on Environmental Statistics and Indicators (Geneva, 17-18 November 2016) it was agreed that the secretariat would prepare a proposal for revised production templates for the energy and biodiversity indicators (ECE/CEP-CES/GE.1/2016/12) as part of the ECE online Guidelines for the application of environmental indicators².
2. The revision of the energy indicators should result in simplified tables, with less redundancy. The list of energy products should be fully consistent with the Standard International Energy Product Classification, better aligned with the IEA Energy Balances, and provide more detail on renewable energy. The revision of the set of biodiversity indicators should take into consideration better alignment with biodiversity-related SDG indicators.
3. The present document was prepared in response to the above request. It provides options for updating and improving the energy and biodiversity-related indicators. The review of the indicators will also provide the basis for the continued review of SEIS establishment in preparation for a mid-term progress report in 2018 and a final SEIS progress report for the Ninth Environment for Europe Ministerial Conference in 2021.

II. Energy Indicators: current situation

4. The set of energy indicators in the ECE online Guidelines currently consists of:
 - G1. Final energy consumption;
 - G2. Total primary energy supply;
 - G3. Energy intensity;
 - G4. Renewable energy supply;
 - G5. Final electricity consumption;
 - G6. Gross electricity production.
5. At its eleventh session (Geneva, 30 June–1 July 2016) the Joint Task Force agreed to add indicators G1 – G4 to the list of core indicators for priority production and sharing.
6. Indicators G5 (final electricity consumption) and G6 (gross electricity production) are still placeholders, and there has been no demand from members of the Joint Task Force to further develop these indicators.

A. G1: Final energy consumption

7. The production template for G1 presents statistics and indicators on final energy consumption, represented by energy supplied to the final consumer for all energy uses – both as total and broken down by major users (industry, transport, households, commercial and public services, and agriculture, forestry and fishery) in accordance with the International Standard Industrial Classification of All Economic Activities (ISIC). The template also includes rows for non-specified users and non-energy use.

² See <http://www.unece.org/env/indicators.html>.

8. The currently used definition of final energy consumption is the following: “Energy Consumption in Industry, Transport and Other sectors (households, commercial and public services, agriculture and forestry, fishery and non-specified consumption) + Non-energy use. It excludes deliveries of energy for transformation, use by the energy producing industries, and distribution losses.” (see Glossary, abbreviations and units of measurement)³.

9. The units of measurement in this template are thousand tons of oil equivalent (ktoe) for energy consumption, and percentage for the shares of particular consumers in final consumption.

10. This production template provides information on trends in final energy consumption, which is an important driver for use of environmental resources and climate change. The trend in final energy consumption (total and broken down by users) provides a broad indication of progress in reducing energy consumption and associated environmental impacts by the different groups of end users. It can be used to help monitor and assess the success of key policies that attempt to influence energy consumption and energy efficiency.

11. Several indicator frameworks, including the Sustainable Development Goals and the Conference of European Statisticians’ core set of climate change-related indicators (CES CC-related indicators) include indicators which use the final energy consumption as nominator or denominator. Examples are:

(a) SDG indicator 7.2.1: Renewable energy share in the total final energy consumption;

(b) CES CC-related indicator 8: Energy consumption by households / capita.

B. G2: Total primary energy supply

12. The production template for G2 provides information on energy resources supplied annually in a country, in total and broken down by fuel (coal, crude oil, oil products, natural gas, nuclear energy, hydropower, geothermal and solar energy, biofuels and waste, electricity, and heat).

13. The used definition for total primary energy supply (TPES) is the following: TPES = Primary production + Imports - export - international bunkers + stock changes.

14. The units of measurements used in this template are kilotons of oil equivalent (ktoe) for total primary energy supply and supply by fuel, and percentages for shares of different types of fuel in total supply.

15. Total primary energy supply, in total and by fuel, is a driving force indicator describing the development of the energy sector and the corresponding levels of energy supply. Examples for indicators based on TPES are

(a) SDG indicator 7.3.1: Energy intensity measured in terms of primary energy and GDP;

(b) OECD Green Growth Indicator on energy intensity: TPES per capita;

(c) OECD Green Growth Indicator on total primary energy supply: Index with base year 2000;

³ See <https://www.unece.org/fileadmin/DAM/env/europe/monitoring/Indicators/G-1-glos-en-final.pdf>.

- (d) OECD Green Growth indicator on renewable energy supply: percentage of TPES;
- (e) OECD Green Growth indicator on energy productivity: GDP per unit of TPES;
- (f) CES CC-related indicator 2: Share of fossil fuels in total primary energy supply (TPES).

C. G3: Energy intensity

16. The production template for G3 calculates two different indicators on energy intensity by using statistics from production template G1 (total final energy consumption) and production template G2 (TPES), and using GDP (PPP at constant prices with base year 2011) as denominator.

17. The ratio between total final energy consumption / supply and GDP is expressed in kilotons of oil equivalent (ktoe) per unit of GDP in international dollars.

D. G4: Renewable energy supply

18. The production template for G4 shows the amount of renewable energy supply – in total and broken down by sources of energy – and its share in a country's total primary energy supply for a calendar year. The renewable energy products are distinguished as follows: hydropower, biomass, biofuels, wind power, solar power, geothermal energy and other renewables.

19. The units of measurement are thousand tons of oil equivalent (ktoe) for total supply and supply of certain types of renewable energy sources. Percentage is used to express the share of different types of renewable energy sources in total primary energy supply.

20. An example for an internationally used indicator on renewables by TPES is the OECD Green Growth indicator on renewable energy supply, which is expressed as percentage of renewables per TPES.

III. Recommended revisions of the ECE energy indicators

A. General recommendations

(a) Currently, the rows of the production tables combine statistical data items (i.e. energy statistics) and automatically calculated values, such as percentages of a total value, or an automatic calculation of a certain indicator (e.g. energy efficiency). It is suggested to restructure the templates in a way that the two different kinds of data cells are clearly separated. This will help the producers and the users of the templates to navigate quicker through the templates and to do simple data validations (e.g. by building sums over a group of data cells).

(b) The formulas currently used in the production templates will produce results even in cases when not all necessary data (i.e. energy statistics) are provided. Currently, empty cells are considered as a value of 0. Therefore, in case of incomplete statistics, a wrong resulting value would be calculated. It is recommended, to revise the formulas in a way that they only calculate a result when all relevant data cells are completed. This would require producers of statistics to fill each cell of the template. It is necessary, to distinguish between n/a (not available) and 0.

(c) There are several duplications in the production templates. For example, production template G2 (total primary energy supply) disaggregates TPES by energy products (such as hydropower), and some of the energy products are repeated in production template G 4 (Renewable energy supply). It is therefore suggested, to request this information only once. It is recommended to integrate production template G4 into production template G2. This will reduce the burden for data producers, simplify validation procedures and improve usability of the information.

(d) The classification of energy products needs to be revised to be fully consistent with the latest version of the Standard International Energy Product Classification (SIEC), which is also used by the International Energy Agency for energy balances.

(e) The indicators energy intensity and total renewable energy supply per TPES may need another revision at a later stage. There are ongoing expert discussions (e.g. in relation with SDG indicators) which may lead to a re-definition of the indicators. For example, the indicator total renewable energy supply per TPES is not very meaningful when a country imports large amounts of electricity. The indicator does not distinguish between imported electricity produced from renewables and imported electricity produced from non-renewables.

B. Specific recommendations on production template G1: Final energy consumption

(a) The currently used definition for final energy consumption is not consistent with the definitions used internationally (e.g. International Recommendations for Energy Statistics (IRES), Eurostat, or OECD) as it includes non-energy use of energy products. The correct term for consumption including both energy uses and non-energy uses would be “final consumption” (according to IEA and IRES). To be fully compatible, the definition for final energy consumption needs to be revised as follows: “Final energy consumption is the total energy consumed by end users, such as households, industry and agriculture. It is the energy which reaches the final consumer's door and excludes that which is used by the energy sector itself. Final energy consumption excludes energy used by the energy sector, including for deliveries, and transformation. It also excludes fuel transformed in the electrical power stations of industrial auto-producers and coke transformed into blast-furnace gas where this is not part of overall industrial consumption but of the transformation sector” (definition as currently used by Eurostat, but fully compatible with IRES).

(b) In the production template the non-energy uses have to be taken out of the calculation of the total final energy consumption, as they are not part of the final energy consumption.

(c) The template should be renamed to “Final consumption for energy and non-energy uses” to avoid further confusion.

21. The proposed structure of the revised production template is the following:

Table 1
Production template for G1 – Final consumption for energy and non-energy uses.⁴

Row	Data item	Unit	1990	1995	2000	2001	2002	...
1	Total final consumption (=row 2+ row 3)	ktoe						
2	Non-energy uses	ktoe						
3	Total final energy consumption of which	ktoe						
4	Industry	ktoe						
5	Transport	ktoe						
6	Households	ktoe						
7	Commercial and public services	ktoe						
8	Agriculture, forestry and fishery	ktoe						
9	Non-specified	ktoe						
	Share of total final energy consumption by activity (calculated automatically)							
10	Industry (row 4 / row 3)	%						
11	Transport (row 5 / row 3)	%						
12	Households (row 6 / row 3)	%						
13	Commercial and public services (row 7 / row 3)	%						
14	Agriculture, forestry and fishery (row 8 / row 3)	%						
15	Non-specified (row 9 / row 3)	%						

C. Specific recommendations on production template G2: Total primary energy supply

(a) The main recommendation is to integrate template G4 (renewable energy consumption).

(b) The list of energy products has to be revised to be fully consistent with SIEC and to allow a breakdown for renewables.

(c) In the breakdown of energy products electricity (i.e. import minus export) needs to be presented separately, as from national energy balances it cannot be distinguished between electricity from renewables and electricity from non-renewables.

22. The proposed structure of the revised production template is the following:

⁴ See <https://www.unece.org/fileadmin/DAM/env/europe/monitoring/Indicators/G-1-en-final.xls>.

Table 2
Production template for G2: Total primary energy supply.⁵

Row	Data item	Unit	1990	1995	2000	2001	2002	...
1	Production of energy	ktoe						
2	Imports of energy	ktoe						
3	Exports of energy	ktoe						
4	International marine and aviation bunkers	ktoe						
5	Stock changes	ktoe						
6	Total primary energy supply (TPE) (Row 1 + row 2 - row 3 - row 4 + row 5) of which	ktoe						
7	Electricity							
8	Non-renewables (=sum of rows 9 to 16)	ktoe						
9	Coal	ktoe						
10	Peat	ktoe						
11	Oil shale and oil Sands	ktoe						
12	Natural gas	ktoe						
13	Oil	ktoe						
14	Waste - non-renewable	ktoe						
15	Nuclear fuels	ktoe						
16	Other non-renewable fuels	ktoe						
17	Renewables (=sum of rows 18 to 28)	ktoe						
18	Solid biofuels	ktoe						
19	Biogases	ktoe						
20	Liquid biofuels	ktoe						
21	Hydropower	ktoe						
22	Geothermal	ktoe						
23	Solar photovoltaic	ktoe						
24	Solar thermal	ktoe						
25	Tide/wave/ocean	ktoe						
26	Wind	ktoe						
27	Waste – renewable	ktoe						
28	Other renewable fuels	ktoe						
29	Total renewable energy supply as percentage of TPES	%						

D. Specific recommendations on production template G3: Energy intensity

23. A revision may be needed at a later stage, as international expert groups are currently revising definitions related to energy intensity.

⁵ See <http://www.unece.org/fileadmin/DAM/env/europe/monitoring/Indicators/G-2-en-final.xls>.

IV. Biodiversity Indicators: current situation

24. The set of biodiversity indicators in the ECE online Guidelines currently consists of:

- D1. Protected areas;
- D2. Biosphere reserves and wetlands of international importance (placeholder);
- D3. Forests and other wooded land;
- D4. Threatened and protected species;
- D5. Trends in the number and distribution of selected species;
- D6. Invasive alien species (placeholder).

A. D1. Protected areas

25. Indicator D1 shows the areas of land, water surfaces and adjacent air layer protected in compliance with the national legislation. It includes the area of protected territories and their share in the total area of the country. This indicator can be further broken down by the categories of natural territories which have a special International Union for Conservation of Nature (IUCN) status and for the national categories of protected areas to demonstrate their respective extent and share in the total area of the country. The units of measurement for D1 is the total area in km² or ha as a percentage of the total country/territory in accordance with national categories and by IUCN categories.

26. The indicator provides a measure of the response to the degradation of ecosystems and the loss of biodiversity in a country. It demonstrates the extent to which areas important for conserving biodiversity, cultural heritage, scientific research (including baseline monitoring of processes in the ecosystems), recreation, natural resource maintenance and other environmental values are protected.

27. It is necessary for this indicator to be based upon spatial data, including maps of designated areas, and inventories of protected areas of the country/territory showing their location, size, date of establishment and protection regime in accordance with national legislation and relevant international requirements. For intercountry comparisons, protected areas could also be grouped by the IUCN categories. Monitoring and update of data should be done on at least an annual basis. Percentage of protected areas can be calculated by the formula: $\text{Share of protected areas (\%)} = (\text{total area of protected areas in hectares or km}^2 / \text{total area of the country in hectares or km}^2) \times 100$.

28. IUCN defines six management categories of protected area falling into two groups. Totally protected areas are maintained in a natural state and are closed to extractive uses. They include Category I, Strict Nature Reserve/Wilderness Area; Category II, National Park; and Category III, Natural Monument or Feature. Partially protected areas are managed for specific uses (e.g. recreation) or to provide optimal conditions for certain species or communities. They include Category IV, Habitat/Species Management Area; Category V, Protected Landscape/Seascape; and Category VI, Protected Area with Sustainable Use of Natural Resources. This methodology is increasingly used for land ecosystems, less so for marine ecosystems, and least for inland water ecosystems. Inland water ecosystems are usually lumped with land in a terrestrial classification. The methodology for this indicator has not been standardized.

29. Ministries of environment in countries of South-Eastern and Eastern Europe, Caucasus and Central Asia generally collect the data on protected areas. Data on protected areas (total number, area, location and date of creation) by national category are published

in annual environmental reports, in national reports on biodiversity status and in statistical yearbooks in many countries. The UN Environment Programme World Conservation Monitoring Centre, in collaboration with IUCN and with input from the IUCN World Commission on Protected Areas, compiles the United Nations List of Protected Areas, which provides the name, IUCN category, location, size and year of establishment of all protected areas meeting the IUCN definition, regardless of size and whether or not they have been assigned an IUCN category for all countries. This information is also included in the World Database on Protected Areas. Good examples are the European Nature Information System, managed by the European Topic Centre on Biological Diversity (ETC/BD in Paris) for the European Environment Agency (EEA) and the European Environment Information and Observation Network (EIONET), which covers, in particular, data on habitats and sites compiled in the framework of Natura 2000 (the EU Habitats and Birds Directives).

30. The current production template for D1 is as follows:

Table 3

Production template for D1. Protected areas.⁶

Row	Data item	Unit	1990	1995	2000	2001	2002	...
1	Country Area	1000km2						
IUCN categories of protected areas								
2	Total areas under protection	1000km2						
3	of which Category Ia (Strict nature reserve)	1000km2						
4	of which Category Ib (Wilderness area)	1000km2						
5	of which Category II (National park)	1000km2						
6	of which Category III (National monument or feature)	1000km2						
7	of which Category IV (Habitat/species management area)	1000km2						
8	of which Category V (Protected landscape / seascape)	1000km2						
9	of which Category VI (Protected area with sustainable use of natural resources)	1000km2						
10	Share of total protected areas in the country area 100 x (Row 2 / row 1)	%						

National categories of protected areas (Please fill in the names of national categories in row 14 and the following rows)

10	Total areas under protection	1000km2						
11	of which Category I (specify)	1000km2						
12	of which Category II (specify)	1000km2						
13	of which Category III (specify)	1000km2						
14	of which Category IV (specify)	1000km2						

⁶ See <https://www.unece.org/fileadmin/DAM/env/europe/monitoring/Indicators/D-1-en-final.xls>.

Row	Data item	Unit	1990	1995	2000	2001	2002	...
15	of which Category V (specify)	1000km2						
16	of which Category VI (specify)	1000km2						
29	Share of total protected areas in the country area 100 x (row 11 / row 1)	%						

B. D2. Biosphere reserves and wetlands of international importance

31. Indicator D2 is presently a placeholder.

C. D3. Forests and other wooded land

32. Indicator D3 shows the total area of forests and other wooded land, the ratio of this area to the country's total area, and the share of forest areas which are natural and planted, designated for production, as well as designated for the protection of soil and water, ecosystem services and biodiversity.

33. The forest areas are measured in thousands of square kilometres, or in thousands of hectares; shares of forests and wooded land, and the share of different categories are provided as a percentage. The indicator provides a measure of the state of forests and other wooded lands in a country and shows trends in its uses and its protection.

34. In data collection and calculations, relevant definitions established by the Food and Agriculture Organization of the United Nations (FAO) for its Global Forest Resources Assessment (2015) and by the Ministerial Conference on the Protection of Forests in Europe (MCPFE) should be used. Forest is defined as land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use. Out of these areas classified as forest, areas which are which are natural or planted forest, areas designated for production, as well as areas designated for the protection of soil and water, ecosystem services and biodiversity can be distinguished. Definitions of designations of forest areas can be found in the glossary to this indicator. The data are generally contained in national forest inventories and obtained by sampling ground surveys, cadastral surveys, remote sensing or a combination of these. The frequency of evaluation is generally five years. The share of forests in country area can be calculated using the formula: Share of forests in country area (%) = (Total forest area in thousands of hectares or km² / the total area of the country in thousands of hectares or km²)

35. In countries of South-Eastern and Eastern Europe, Caucasus and Central Asia, agencies or ministries of forestry collect the relevant data and submit them to the FAOSTAT global multilingual database and the electronic database of the Expert Committee on Temperate and Boreal Forest Resources (TBFRA) of FAO/ECE. Data on the area of forests and their state are published in several countries in annual environmental reports, in national statistical yearbooks or in specialized yearbooks.

36. The current production template for D3 is as follows:

Table 4
Production template for D3. Forests and other wooded land.⁷

Row	Data item	Unit	1990	1995	2000	2001	2002	...
Basic Data								
1	Country area	1000km2						
2	Total forest area	1000km2						
3	Share of forests in country area (row 2 / row 1)	1000km2						
4	Total area of other wooded land	1000km2						
5	Share of other wooded land in country area (row 4 / row 1)	%						
Natural and planted forest								
10	Total forest area (=row2)	1000km2						
	of which							
	Primary forests	1000km2						
	Primary forests (Row 9 / row 7)	%						
	Other naturally regenerated forest	1000km2						
	Other naturally regenerated forest (row 11 / row 7)	%						
	Planted forest	1000km2						
	Planted forest (row 13 / row 7)	%						
Forest area designated for production								
12	Total forest area (=row2)	1000km2						
	of which							
	Production forest	1000km2						
	Production forest (row 18 / row 16)	%						
	Multiple use forest	1000km2						
	Multiple use forest (row 20 / row 16)	%						
Forest area designated for protection of soil, water and ecosystem services								
	Total forest area (=row2)	1000km2						
	of which							
	Protection of soil and water	1000km2						
	Protection of soil and water (row 25 / row 23)	%						
	Ecosystem services, cultural or spiritual values	1000km2						
	Ecosystem services, cultural or spiritual values (row 27 / row 23)	%						

⁷ See <https://www.unece.org/fileadmin/DAM/env/europe/monitoring/Indicators/D-3-en-final.xls>.

Row	Data item	Unit	1990	1995	2000	2001	2002	...
Forest area protected and designated for the conservation of biodiversity								
	Total forest area (=row2)	1000km2						
	of which							
	Conservation of biodiversity	1000km2						
	Conservation of biodiversity (row 32 / row 30)	%						
	Forest area within protected areas	1000km2						
29	Forest area within protected areas (row 34 / row 30)	%						

D. D4. Threatened and protected species

37. Indicator D4 presents total numbers of species in particular taxonomic groups, the numbers of protected species, and the numbers of threatened species - in total and by the level of threat of extinction (critically endangered, endangered and vulnerable).

38. The units of measurement are the numbers of species for total, protected, and threatened species; percentage for shares of protected and threatened species in relation to the total number of species, change in threat status of particular taxonomic groups at the national level (national red list index). It relates to indicator D5: Trends in the number and distribution of selected species.

39. The indicator provides a measure of the state of biodiversity in terms of the number of threatened species and the effectiveness of national responses, i.e. actions taken to conserve national and global biodiversity.

40. A number of multilateral environmental agreements recognize that biodiversity has an intrinsic value and that biodiversity maintenance is essential for human life and sustainable development. Many species are currently decreasing in population size and are at risk of extinction. For many years, the International Union for the Conservation of Nature (IUCN) and other international organizations have been monitoring the extent and pace of biodiversity degradation by assigning species to categories of threat through detailed assessments of information against a set of quantitative criteria. Based on this, IUCN has developed a "Red List of Threatened Species". The 2017 edition lists a total of 85,604 species. Countries are also developing red lists of species that are threatened at the national level, including rare species, and are establishing appropriate protection regimes for these species. Some of the globally threatened species that can be found in countries of South-Eastern and Eastern Europe, Caucasus and Central Asia may not be classified as threatened at the national level. Nevertheless, countries have an important responsibility to care for these species even though they are not yet threatened on their territories. To what extent national policies on nature and biodiversity reflect this responsibility is shown by the information that the indicator provides on the total number of globally threatened species present and protected in the country.

41. The IUCN Red List of Threatened Species ("The IUCN Red List") is the most authoritative and widely accepted means of assessing species' extinction risk. It provides information and analyses on the status, trends and threats to species. The IUCN Red List assesses the risk of extinction of a particular species according to a standardized methodology with quantitative thresholds that assign species to one of nine Red List categories. The IUCN Red List Index (RLI) measures overall trends in extinction risk for

groups of species based on genuine changes in their Red List status over time. Further information about the RLI and how it is calculated can be found in the Red List Index.⁸

42. In countries of South-Eastern and Eastern Europe, Caucasus and Central Asia, data at the national level are available from ministries of environment, agencies dealing with protected areas and statistical agencies. In the majority of countries, information on threatened species is collected in “red books”, which include data on the abundance and state of rare and/or protected species of wild fauna and flora and conservation measures regarding them. Red books should be published at least once every 10 years. In addition, subnational red books are being published in several countries of South-Eastern and Eastern Europe, Caucasus and Central Asia. The Species Database of the UN Environment Programme World Conservation Monitoring Centre (WCMC) provides detailed information on species of conservation importance. The UN Environment Programme World Conservation Monitoring Centre maintains the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Trade Database. The European Nature Information System managed by the European Topic Centre on Biological Diversity (ETC/BD) covers data on species compiled in the framework of Natura 2000 and other relevant instruments.

43. The current production template for D4 is as follows:

Table 5

Production template for D4. Threatened and protected species.⁹

Row	Data item	Unit	1990	1995	2000	2001	2002	...
Mammals								
1	Total number of species	No.						
2	Number of species protected	No.						
3	Percentage of species protected (row 2 / row 1)	%						
4	Number of species threatened	No.						
5	Percentage of species threatened (row 4 / row 1)	%						
	of which (row 4)							
6	Critically endangered	No.						
7	Critically endangered (row 7 / row 1)	No.						
8	Endangered	No.						
9	Endangered (row 9 / row 1)	%						
10	Vulnerable	No.						
11	Vulnerable (row 11 / row 1)	%						
Birds								
	Same steps apply as for rows 1 to 11							
Fishes								
	Same steps apply as for rows 1 to 11							

⁸ See <http://www.iucnredlist.org/technical-documents/publications>.

⁹ See <https://www.unece.org/fileadmin/DAM/env/europe/monitoring/Indicators/D-4-en-final.xls>.

Row	Data item	Unit	1990	1995	2000	2001	2002	...
Reptiles								
	Same steps apply as for rows 1 to 11							
Amphibians								
	Same steps apply as for rows 1 to 11							
Invertebrates								
	Same steps apply as for rows 1 to 11							

E. D5. Trends in the number and distribution of selected species

44. Indicator D5 specifies trends in the population size of various selected species in a defined area (country, region or designated area). The occurrence of species (population size) is expressed as the number of mature individuals in a defined area (thousands of individuals). This indicator relates to indicator D4: Threatened and protected species.

45. The indicator provides a measure of the state of populations of selected animal species of significance and of the effectiveness of national responses, i.e. actions taken to conserve national and global biodiversity.

46. A number of multilateral environmental agreements recognize that biodiversity has an intrinsic value and that biodiversity maintenance is essential for human life and sustainable development. Many species are currently decreasing in population size and are at risk of extinction. This indicator shows the situation for populations of fauna that belong to groups of species that are of major resource relevance and are important from the point of view of biodiversity conservation ("selected species"). The indicator will help decision makers to balance economic interests with biodiversity protection (especially when issuing hunting and forest harvest licenses), and to maintain a balance in ecosystems.

47. The following categories of species might be considered "selected species" when developing a monitoring programme:¹⁰

(a) **Keystone species:** Species that play an essential role in the structure, functioning or productivity of a habitat or ecosystem at a defined level (habitat, soil, seed dispersal, etc.). The loss of these species will significantly affect the population sizes of other species in the ecosystem, potentially leading to further species loss ("cascade effect"). Examples include the bats and insects role in maintaining pollination;

(b) **Flagship species:** These are species of particular intrinsic (cultural and historical) appeal to the citizens of the country as a whole or its regions, which are selected to act as an ambassador, icon or symbol for a defined habitat, issue, campaign or environmental cause. As there might be overlaps between "flagship" and "keystone" species, these should be specified when providing the data;

(c) **Endemic species:** Any area contributes to global biodiversity by the overall number of different species within it and by the proportion of species that are unique to a defined geographical area, i.e. are endemic to the area. Conservation of endemic species,

¹⁰ See the EEA's Environmental Terminology and Discovery Service (ETDS) (<http://glossary.eea.europa.eu/terminology/>).

particularly those sharing a discrete geographic area, can be an effective way to maintain global biodiversity.

48. Information on the population of species should be collected through the consistent long-term application of an appropriate survey technique that is widely accepted by the scientific community. Retrospective data on population sizes can be obtained through a review of published literature, including previous field study reports, to find material that is appropriate for comparison with the methodologies currently in use. While it is usually impossible to count every individual within a population or area, knowledge of habitat requirements and species population density in sample areas, coupled with data on climate, altitude, soil type and/or vegetation cover, can be used to estimate the population size in the area of interest. In many countries, geographic information systems (GIS) are commonly used to analyse the spatial data. It is important to verify population size predictions through fieldwork. Trends in population sizes are determined on the basis of total cyclic oscillations which reflect all conditions relating to the existence, protection and use of biological resources.

49. This indicator is determined separately for each species. For species for which there are only assessments of population sizes in particular areas for observation (in administrative territorial units, particular Protected Areas or National Parks), the reference point for each observation area is the assessment of the quantity in the year in which the monitoring was introduced.

50. The United Nations Environment Programme World Conservation Monitoring Centre and the World Wildlife Fund (WWF) have designed and implemented a system (the Living Planet Index) to produce indicators on biodiversity change over time, principally at the global and continental levels. The European Environment Agency (EEA) is currently considering abundance variation trends in the number of species over years for farmland, woodland, park and garden birds as well as distribution variation trends over 20–25 years for butterflies.

51. Completeness of the basic data on species varies between countries of South-Eastern and Eastern Europe, Caucasus and Central Asia depending on their conditions and national priorities. Some data that may be suitable as a basis for this indicator are collected by central environmental institutions, State Statistics bodies, academic institutions and nature conservation associations. To cite two international-level examples: BirdLife International maintains a database on farmland birds and on trends involving woodland, park and garden birds, and the Dutch Butterfly Conservation maintains a database on trends involving butterflies.

52. The current production template for D5 is as follows:

Table 6

Production template for D5. Trends in the number and distribution of selected species.¹¹

Row	Data item	Unit	1990	1995	2000	2001	2002	...
Keystone species								
1	Scientific and common name(s) of specie 1	Thousands of individuals						
2	Scientific and common name(s) of specie 2	Thousands of individuals						
3	...	Thousands of						

¹¹ See <http://www.unece.org/fileadmin/DAM/env/europe/monitoring/Indicators/D-5-en-final.xls>.

Row	Data item	Unit	1990	1995	2000	2001	2002	...
		individuals						
	Flagship species							
	Same steps apply as for row 1 to 3							
	Endemic species							
	Same steps apply as for row 1 to 11							
	Other species							
	Same steps apply as for row 1 to 11							

F. D6. Invasive alien species

53. Indicator D6 is presently a placeholder.

V. Recommended revisions of the ECE biodiversity indicators

A. D1. Protected areas

54. Protected Area Coverage of species can be difficult to measure, as the species maps do not provide sufficient granularity to be certain that species can be located within specific Protected Areas. A more accurate measurement of the effectiveness of protected areas for conservation outcomes for indicator D1 would be of Protected Area Coverage of Key Biodiversity Areas. This is an accepted indicator of progress towards Aichi Target 11 and it will furthermore align D1 with the following SDG indicators:

(a) SDG indicator 14.5.1: Coverage of protected areas in relation to marine areas;

(b) SDG indicator 15.1.2: Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type;

(c) SDG indicator 15.4.1: Coverage by protected areas of important sites for mountain biodiversity.

55. It can also be noted that the indicator for SDG target 6.6 “By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes” is not a protected areas indicator. SDG indicator 6.6.1: “Change in the extent of water-related ecosystems over time” does not align with D1.

56. It is recommended that the secretariat updates the production table for D1 to be adopted by the Joint Task Force during its fourteenth session. It is further recommended that this update will take into account Protected Area Coverage of Key Biodiversity Areas.

B. D2. Biosphere reserves and wetlands of international importance

57. It is recommended that the secretariat develops a production table for D2 to be adopted by the Joint Task Force during its fourteenth session. This work will integrate any updates made for D1 in taking account of Protected Area Coverage of Key Biodiversity Areas. This will also ensure that D2 is better aligned with SDG indicators 14.5.1, 15.1.2, and 15.4.1.

58. The production table for D2 should take into account:

(a) Criteria for Identifying Wetlands of International Importance, as adopted by the parties to the Convention on Wetlands (Ramsar, Iran, 1971) and indicators listed in the 4th Strategic Plan 2016–2024 of the Convention;¹²

(b) UNESCO World Network of Biosphere Reserves (WNBR).

C. D3. Forests and other wooded land

59. It is recommended that the secretariat updates, if necessary, the production table for D3 to be adopted by the Joint Task Force during its fourteenth session.

60. Revisions may be needed to ensure that the production table for D2 is in line with:

(a) SDG indicator 15.1.1: Forest area as a proportion of total land area;

(b) SDG indicator 15.2.1: Progress towards sustainable forest management;

(c) Updated Pan-European indicators for Sustainable Forest Management that were endorsed by the ministers at the 7th Ministerial Conference on the Protection of Forests in Europe (FOREST EUROPE).¹³

D. D6. Invasive alien species

61. It is recommended that the secretariat develops a production table for D6 to be adopted by the Joint Task Force during its fourteenth session.

62. The production table for D2 should take into account:

(a) SDG indicator 15.8.1: Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species;

(b) European Environment Agencies indicator on invasive alien species in Europe;¹⁴

(c) Convention on Biological Diversity indicator on trends in invasive alien species and links to target 9 of the convention.¹⁵

¹² See http://www.ramsar.org/sites/default/files/documents/library/4th_strategic_plan_2016_2024_e.pdf.

¹³ See http://foresteurope.org/wp-content/uploads/2016/11/III.-ELM_7MC_2_2015_Ministerial_Declaration_adopted-2.pdf#page=5

¹⁴ See <http://www.eea.europa.eu/data-and-maps/indicators/invasive-alien-species-in-europe/invasive-alien-species-in-europe>.

¹⁵ See <https://www.cbd.int/sp/targets/rationale/target-9>.