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European Topic Centre on Nature Protection and Biodiversity

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A contribution to Work Package 2: Indicators, data flows and databases

AN INVENTORY OF BIODIVERSITY INDICATORS IN EUROPE

Final Draft

prepared by the

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1 Introduction

There are three basic functions of indicators - simplification, quantification, and communication. Indicators generally simplify in order to make complex phenomena quantifiable so that information can be communicated (DOE 1996). Indicators are commonly understood to serve as a communication tool about the state of a selected topic. Hence, biodiversity indicators support communication about the state of biodiversity in a selected region. The region concerned in the current report covers the 31 EEA member states[1], or more generally the multinational level.

As part as its main mandate, the European Environment Agency is developing a reporting strategy in order to inform on environmental trends at European level on a regular basis. For the purpose, a core set of indicators has to be defined. It will include a limited number of indicators that are necessary to monitor and to guide policies, such as sectorial integration, thematic strategies, and important policy processes. The indicators in the core set may come from directly the EEA work programme, but in most cases the data come from other organisations and in some cases the assessment is also coming from another source. The European Topic Centre on Nature Protection and Biodiversity (ETC/NPB) is in charge of the core set of Biodiversity indicators. It is recognised that this is not an easy task, a feasibility study for the EEA pointed out that for certain aspects it is even regarded as impossible to identify quantifiable indicators (Kristensen 1997).

Prior to the definition of the core set of biodiversity indicators, there is a need to review all international initiatives underway at various geographical levels that aim at developing operational indicators for specific fields of interest (such as sustainable development, agriculture, landscapes, and biodiversity). This specific task has been entitled to the European Centre on Nature Conservation (ECNC), as a member of the ETC/NPB Consortium.

The current report defines criteria for selecting biodiversity indicators (chapter 2), it looks at the target group and their requirements (chapters 3 and 4), it provides an overview of existing indicator development initiatives and biodiversity indicators developed to date (chapters 5 and 6). Comparing the requirements and the existing indicators forms the basis for the gap analysis (chapter 7) that will feed into the discussion on developing a core set of biodiversity indicators. The main content of this report is included as an annexed table listing all indicators found during the study period (August 2001 – January 2002).

The information in this report is based on consultations with various experts and stakeholders (chapter 8) and numerous publications and other information sources (chapter 9).

The author wishes to thank those that have provided valuable input and review throughout this study: the people that have responded to targeted enquiries (see 5.2), the participants of the indicator workshop held at the ETC/NPB in Paris on 17-18 October 2001 and the EIONET national representatives that participated in the EIONET meeting in Budapest on 29-30 October 2001. A special thanks also goes to Melanie Heath and Dominique Richard.

[1] Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Turkey, United Kingdom

2 Criteria for selection of biodiversity indicators

Pre-defined criteria help in selecting the right indicators for the purpose of the current exercise. They provide guidance in the process of assessing whether a certain indicator is suitable for our purposes or not. This will help focus the attention to what is really needed by the target group, without ignoring the importance of other indicators that may be more suitable for other purposes or geographical scales.

Criteria for selecting biodiversity indicators to be incorporated in this study are derived from various studies (Reid *et al*. 1993, Bosch & Söderbäck 1997, Cannell *et al.* 1999, UNEP 1999, 2001, ten Brink 2000, European Commission 2001a). The list below is a compilation of those criteria that fit best for the purposes of this report.

The indicators should meet the following criteria:

- be easy to understand and policy-relevant;
- provide factual, quantitative information;
- be normative (possibility to compare to a baseline situation)
- be scientifically sound and statistically valid;
- be responsive to change in time/space;
- be technically feasible and cost-efficient to use within acceptable limits (in terms of data collection);
- be useable for scenarios for future projections;
- allow comparison between member states;
- allow aggregation at national and multinational level;
- take into account country-specific biodiversity;
- be user-driven.

These criteria have not all been applied to all indicators listed in the current report (otherwise the list would be slimmed down considerably). They should actually be applied in a next step towards defining a core set of biodiversity indicators.

3 Definition of target group

The target group for biodiversity indicators consists of two groups: those providing the data on the indicators and those making policy decisions on the basis of the message expressed by the indicators.

3.1 Data providers

Once a core set of biodiversity indicators has been selected data will need to be gathered and provided on a regular basis (in an agreed frequency) as a basis for expressing the indicator value. This is an activity that on the national or multinational level is carried out by research institutes, non-governmental organisations, volunteers and/or government agencies. In terms of the current report the target group among the data providers consists of:

- European Environment Agency and its European Topic Centre on Nature Protection and Biodiversity;
- EIONET National Reference Centres on biodiversity;
- International NGOs.

3.2 Policymakers

Indicators are communication tools that in the first instance are meant to inform policymakers and those making decisions that affect biodiversity. As the current survey focuses on the EEA region the primary target group consists of:

- European Council of Environment Ministers;
- European Commission (especially Directorates-General Environment, Agriculture, Energy and Transport, Fisheries, Regional Policy and Research and the Joint Research Centre);
- National governments of the EEA member states.

4 Inventory of policy objectives for biodiversity

When developing a monitoring programme and indicators that feed into it, it is of primary importance to define objectives from the very start, objectives against which future results can be compared (Hellawell 1991). These objectives can be translated in generic policy questions. Each indicator should provide (part of) the answer to such policy question.

An analysis of twelve selected international instruments (conventions, directives, agreements, etc) by JNCC and UNEP-WCMC in the framework of developing the Reporting Obligations Database (ROD)[2] identified 1,752 questions that countries need to answer as part of their reporting obligations (JNCC & UNEP-WCMC 2000). However, most of these questions concern reporting on activities rather than on state and trends in biodiversity or the effectiveness of policy.

For the purpose of the current study the major policy questions to be answered and for which indicators can provide useful tools are derived from the main objectives of twelve biodiversity-related global and European policy instruments.

- Ramsar Convention (1971);
- Bern Convention (1979);
- Bonn Convention (1979);
- EC Birds Directive (1979);
- EC Habitats Directive (1992);
- Convention on Biological Diversity (1992);
- Pan-European Biological and Landscape Diversity Strategy (1995);
- Ministerial Conference on the Protection of Forests in Europe (1990, 1993, 1998);
- EC Water Framework Directive (2000);
- EC Biodiversity Strategy (1998) and its four sectorial Biodiversity Action Plans (2001);
- EU Sustainable Development Strategy (2001);
- Sixth Environment Action Programme (2001).

4.1 Policy instruments and their objectives

4.1.1 Ramsar Convention

Since 1996 the Ramsar Convention's aims and objectives are concentrated into a mission statement, as included in the Ramsar Strategic Plan 1997-2002[3]. The Convention's mission is the conservation and wise use of wetlands by national action and international cooperation as a means to achieving sustainable development throughout the world. Amongst other means this mission is supported by objectives covering raising awareness of wetland values, capacity building, designation of wetlands as Ramsar sites and ensuring conservation of all sites listed.

4.1.2 Bern Convention

The aims of this Convention are formulated in its article 1 and are '… to conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co-operation of several States, and to promote such co-operation. Particular emphasis is given to endangered and vulnerable species, including endangered and vulnerable migratory species.' (Council of Europe 1979)

[2] http://rod.eionet.eu.int

[3] http://ramsar.org/key_strat_plan_e.htm

4.1.3 Bonn Convention

The CMS Guide[4] spells out the aims of the Convention on Migratory Species as follows: The CMS aims to conserve migratory (avian, marine and terrestrial) species over the whole of their range. The Convention provides a framework within which Parties may act to conserve migratory species and their habitats by:

1. adopting strict protection measures for migratory species that have been categorised as being in danger of extinction throughout all or a significant proportion of their range (listed in Appendix I of the Convention);
2. concluding Agreements for the conservation and management of migratory species that have an unfavourable conservation status or would benefit significantly from international co-operation (listed in Appendix II to the Convention); and
3. undertaking joint research and monitoring activities.

4.1.4 EC Birds Directive

The primary objective of the Birds Directive is laid down in its Article 2 and is '…to maintain the population of the species […] at a level which corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements, or to adapt the population of these species to that level.' (European Commission 1979).

To achieve this objective the Birds Directive formulates specific measures to be taken by the Member States in the field of area protection (establishment of Special Protection Areas, SPAs) and species protection. Species concerned are listed in the Annexes I – V to the Directive.

4.1.5 EC Habitats Directive

Article 2 of the Habitats Directive formulates the aim '…to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies' (European Commission 1992). It specifies measures in support of this aim, being '…to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest.' The measures '…shall take account of economic, social and cultural requirements and regional and local characteristics'.

In order to achieve its objective the Habitats Directive calls for the establishment of a European ecological network, called Natura 2000, which consists of Special Areas for Conservation (SACs), to be designated under the Habitats Directive, and the SPAs as designated by the Birds Directive. Habitats and species to be affected by the Directive and special measures to be taken are listed in Annex I – VI to the Directive.

4.1.6 Convention on Biological Diversity

The objectives of the CBD, laid down in Article 1 of the Convention, are threefold and general in terms (because global in scope) (UNEP 1992):

- the conservation of biological diversity;
- the sustainable use of its components;
- the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources

Articles 6 through to 20 of the CBD formulate specific measures and objectives. A detailed analysis of these articles lists a total of 63 measurable objectives for which indicators may be developed. All except three of these objectives would require response indicators reporting on activities carried out. Two of the objectives (art. 7.a and b) may result in a status indicator and one (art. 7.c) can provide an impact indicator.

[4] http://www.wcmc.org.uk/cms/

4.1.7 Pan-European Biological and Landscape Diversity Strategy

The Pan-European Strategy (PEBLDS) sets out to achieve the following objectives over the period 1996-2016 (Council of Europe *et al.* 1996):

1. Conservation, enhancement and restoration of key ecosystems, habitats, species and features of the landscape through the creation and effective management of the Pan-European Ecological Network.
2. Sustainable management and use of the positive potential of Europe's biological and landscape diversity through making optimum use of the social and economic opportunities on a local, national and regional level.
3. Integration of biological and landscape diversity conservation and sustainable use objectives into all sectors managing or affecting such diversity.
4. Improved information on, and awareness of, biological and landscape diversity issues, and increased public participation in actions to conserve and enhance such diversity.
5. Improved understanding of the state of Europe's biological and landscape diversity and the processes that render them sustainable.
6. Assurance of adequate financial means to implement the Strategy.

4.1.8 Ministerial Conference on the Protection of Forests in Europe

The Conference Declaration of the First Ministerial Conference of the Protection of Forests in Europe (MCPFE, Strasbourg 1990) formulates the intentions of some 40 European countries on protection of forests. These are to:

1. promote and reinforce cooperation between European states in the field of forest protection and sustainable management, by developing exchanges of information and experience, and by supporting the efforts of the international organizations concerned;
2. improve exchanges of information between forestry research workers, managers and policy makers, both within and between the signatory countries, in order that the most recent advances can be integrated into the implementation of forest policies;
3. encourage operations for restoring damaged forests;
4. demonstrate, by way of an agreement on common objectives and principles, their will to implement, progressively, the conditions and the means necessary for the long-term management and conservation of the European forest heritage;
5. examine the follow-up of decisions taken during the present conference and pursue the actions that will have been initiated, in the course of any subsequent meetings of government ministers or officials, and of international institutions, responsible for seeing that forests fully assume their ecological, economic and social functions.

In terms of biodiversity specific objectives have been formulated under the MCPFE framework in the Biodiversity Work-Programme[5] that was jointly developed by the MCPFE and the pan-European Ministerial Process 'Environment for Europe'. These are:

1. Conservation and appropriate enhancement of biodiversity in sustainable forest management;
2. Adequate conservation of all types of forests in Europe;
3. Clarification of the role of forest ecosystems in enhancing landscape diversity;
4. Clarification of impacts of activities from other sectors on forest biological diversity.

4.1.9 EC Water Framework Directive

Specifically point (a) of article 1 of this Directive is of relevance to biodiversity, as it sets out '…to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which prevents further deterioration and protects and enhances the status

[5] Work-Programme on the Conservation and Enhancement of Biological and Landscape Diversity in Forest Ecosystems 1997-2000, http://www.mcpfe.org/Basic/FS-Work-Programmes.html

of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems' (European Commission 2000a)

4.1.10 EC Biodiversity Strategy

The EC Biodiversity Strategy is the EU's response to the Convention on Biological Diversity and aims '… to anticipate, prevent and attack the causes of significant reduction or loss of biological diversity at the source. This will help both to reverse present trends in biodiversity reduction or losses and to place species and ecosystems, which includes agro-ecosystems, at a satisfactory conservation status, both within and beyond the territory of the European Union.' (European Commission 1998).

This overall objective is supported by specific objectives as formulated for eight policy areas in section III of the Strategy. In addition concrete objectives and how to achieve them are laid down in four sectorial biodiversity action plans, published in 2001 (European Commission 2001c).

A detailed analysis of the objectives as formulated in section III of the EC Biodiversity Strategy reveals the need for 58 response indicators to measure progress in achieving these objectives.

4.1.11 EU Sustainable Development Strategy

Although it is a generic instrument that relates to the broader environment the EU Sustainable Development Strategy includes three 'Headline objectives' focusing on natural resources. These are to 'Break the links between economic growth, the use of resources and the generation of waste; protect and restore habitats and natural systems and halt the loss of biodiversity by 2010; and improve fisheries management to reverse the decline in stocks and ensure sustainable fisheries and healthy marine ecosystems, both in the EU and globally.' (European Commission 2001b)

4.1.12 EC Sixth Environment Action Programme

Also the Sixth Environment Action Programme has a scope that covers the wider environment but has at the same time, like the Sustainable Development Strategy, a component focusing on biodiversity with the objective '…to protect and restore the functioning of natural systems and halt the loss of bio-diversity in the European Union and globally. To protect soils against erosion and pollution.' (European Commission 2001d).

4.2 Policy questions

If one wants to monitor whether objectives or targets have been met these objectives should be formulated following the SMART principle (Specific, Measurable, Achievable, Result oriented, Time bound). However, the objectives of the twelve instruments listed above do not match this principle because they are generic in terms and scope (e.g. use of terms such as 'favourable conservation state', 'to promote', 'to maintain', etc.). Still, the policy questions that relate to the objectives can be formulated in a more concrete way.

The short list of questions presented below is derived from the policy objectives. A similar list, containing 45 (sub)questions arranged according to the pressure-state-response framework, is presented to CBD/SBSTTA-7 (UNEP 2001) and focuses on the CBD.

1. What is the threat status and the trend of Europe's biodiversity (wild flora and fauna and their natural habitats)?
2. What is the conservation status of Europe's biodiversity?
3. What measures are taken to conserve or restore biodiversity?
4. Are these measures effective in reaching the objectives?
5. Are biodiversity conservation measures integrated into other sectors of society?
6. Is use of biodiversity components carried out in a sustainable way?
7. What is the status of awareness and participation of the public and policymakers?
8. What is the status of information availability and understanding of biodiversity?

9. Are financial means available for biodiversity conservation and how are they spent?
10. What driving forces impact on biodiversity?
11. Are pressures on biodiversity or causes for biodiversity loss being tackled?
12. What is the level of the main pressures on biodiversity?

5 Overview of existing initiatives for developing biodiversity indicators

5.1 Information sources

For the purpose of this study the following information sources on developing biodiversity-related indicators on the (supra)national level have been analysed. From these information sources the table of indicators as listed in the annex is derived.

- A Framework for Indicators for the Economic and Social Dimensions of Sustainable Agriculture and Rural Development (European Commission 2001a)
- Agri-environmental Indicators for Sustainable Agriculture in Europe (Wascher 2000)
- An Approach to Assessing Biological Diversity (Prescott-Allen et al. 2000)
- Biodiversity indicators for integrated environmental assessments at the regional and global level (WCMC 1996)
- Biodiversity indicators for policy-makers (Reid et al. 1993)
- Biodiversity indicators for the OECD Environmental Outlook and Strategy (ten Brink 2000)
- CBD indicators of biological diversity (UNEP 1997, 1999)
- CSD Working List of Indicators of Sustainable Development (UNCSD 1996)
- EEA indicators (EEA web site 2002)
- Environmental Indicators for Agriculture (OECD 2001)
- Environmental Signals 2001 (EEA 2000a)
- Environmental Signals 2002 – draft list of contents (EEA 2001b)
- European Environmental State Indicators (Bosch & Söderbäck 1997)
- Indicators and environmental impact assessment (UNEP 2001)
- Indicators for the Integration of Environmental Concerns into the Common Agricultural Policy (European Commission 2000b)
- Indicators of climate change in the UK (Cannell et al. 1999)
- Living Planet Report 2000 (Loh 2000)
- MCPFE AG Draft Recommendations for the Improvement of the Pan-European Indicators for Sustainable Forest Management for Criteria 2, 4 and 5 (discussion document, MCPFE 2001a)
- Minutes of the Second MCPFE Workshop on the Improvement of Pan-European Indicators for SFM held on 24-25 September 2001 (MCPFE 2001b)
- Questionnaire on the state of the environment (OECD & EUROSTAT 2001)
- Pan-European Criteria and Indicators for Sustainable Forest Management (MCPFE 1998)
- Proposed core indicators for water (EEA 2001a)
- Scoping Study for Fisheries indicators (Zenetos 2001)
- Statistical information needed for Indicators to monitor the Integration of Environmental concerns into the Common Agricultural Policy (European Commission 2001e)
- TEPI – Towards Environmental Pressure Indicators for the EU (EUROSTAT 2001)
- TERM 2000 (EEA 2000b)
- Towards Ecological Quality Objectives for North Sea Benthic Communities (de Boer et al. 2001)
- Using Bird Data to Develop Biodiversity Indicators for Agriculture (Heath & Rayment 2001)

- Water and Wetland Index (Hygum et al. 2001)
- World Conservation Strategy (IUCN 1980)
- World Resources 2000-2001 (UNDP *et al.* 2000)

5.2 Experts consulted

- BirdLife International: Des Callaghan, Melanie Heath
- Dutch Butterfly Conservation (De Vlinderstichting): Chris van Swaay
- EFI: Mercedes Rois
- EIONET National Reference Centres
- ETC/ACC: André Jol, Roel van Aalst
- ETC/NPB: Dominique Richard, Sophie Condé
- ETC/TE: Chris Steenmans
- ETC/Water: Anita Künitzer, Niels Thyssen
- ETC/WMF: Dimitrios Tsotsos
- IFEN: Laurent Duhautois
- JNCC: James Williams
- JRC: Sten Folving
- NINA: Erik Framstad
- NoLIMITS project: Ian Simpson, Andrew Sier (http://nolimits.nmw.ac.uk)
- OECD: Kevin Parris
- Wetlands International: Ward Hagemeijer

5.3 International initiatives

This paragraph tries to provide an overview of the ongoing and planned international indicator initiatives most relevant to biodiversity in Europe and the linkages (or lack of) between them. For this purpose a certain classification has been applied, which inevitably involves a certain level of judgement and subjectivity.

Name	Topic	Lead organisation	Aim	Level of development	Status	Linkages
Core set of biodiversity indicators	Biodiversity	EEA and ETC/NPB	EEA assessment and reporting	Intergovernmental	Development (ready mid 2002)	Other ETCs, CBD, EFI, BirdLife Int., Wetlands Int., ECNC, OECD, MCPFE
Biodiversity headline indicators	Biodiversity	EEA and ETC/NPB	EU Council Spring meetings	Intergovernmental	Development (ready by Apr. 2002)	Other ETCs, EC
IBAs, threatened birds, common birds	Biodiversity based on bird data	BirdLife International	Reporting and assessment	NGO	Development/ implementing	EEA, OECD, …
Wetland indicators	Biodiversity of wetlands	Wetlands International	Reporting	NGO/Convention	Development	EEA, Ramsar
Forest biodiversity indicators	Forest biodiversity, sustainable forestry	MCPFE	MCPFE meetings	Intergovernmental	Development, ready by 2003	EEA, EFI, CBD
Core set of biodiversity indicators	Biodiversity	CBD, SBSTTA	CBD/COP, national reporting	Intergovernmental	Development, ready by COP7	EEA, MCPFE
ELISA Agri-environmental indicators	Agri-environment	ECNC (for EC DG Research)	Assessment agricultural policies	Intergovernmental	Testing in ENRISK project	OECD, EEA, FAO, EUROSTAT
Integration indicators	Agri-environment	EC DG Agriculture	Reporting on integration of environment in agriculture	Intergovernmental	Proposed	EEA, OECD, ELISA, FAO, EUROSTAT
Sustainability indicators	Sustainable development	EC	EU Council Spring meetings	Intergovernmental	Proposed	EEA, UNCSD
Agri-biodiversity indicators	Agri-biodiversity	OECD	National reporting	Governmental	Testing, implementing	ELISA, EEA, EUROSTAT, FAO, EC
Living Planet Index	Biodiversity	WWF	Global reporting	NGO	Implementing	UNEP-WCMC
Sustainable development indicators	Sustainable development	UNCSD	Global reporting	Intergovernmental	Implementing	EEA, EC
Index development	Biodiversity, based on red lists	IUCN	National reporting	NGO	Proposed	CBD
TEPI environmental pressure indicators	Environmental pressure	EUROSTAT	National reporting, sectorial assessment	Intergovernmental	Implementing	EEA, EC
World Resources	Environment, inc. biodiversity	WRI	Global reporting	NGO	Implementing	UNDP, UNEP, World Bank

6 Overview of existing biodiversity indicators

From the information sources listed in the previous paragraph an extensive list – totalling 655 including duplicates – has been compiled of all biodiversity-related indicators proposed or used (see annex). While completing the list it was found difficult to draw the cut-off line on which indicators to include and which not. Especially in the light of integrated monitoring virtually all types of indicators could be regarded as relevant to biodiversity in one way or another.

For example, when reviewing the list as used by UNDP *et al.* (2000) for the World Resources 2000-2001 publication data for economic indicators such as international tourism receipts or national poverty is included. Arguably such information can be regarded as pressure indicator that affects biodiversity via use of its components. For the current study, however, only those indicators with a direct link to biodiversity have been included, which inherently creates a certain level of subjectivity in choosing.

Also in terms of state indicators it turned out to be difficult to draw the line, since biodiversity indicators have hierarchical relationships (see e.g. Noss 1990) and hence a certain duplication factor (e.g. total number of swallowtail butterfly species < total number of butterfly species < total number of species). The study only took into account biodiversity indicators (indicators that can be used to measure biodiversity) and not biological indicators (indicators that can be used to measure an environmental or ecological characteristic using a biological component) and tries to include those that can be used as direct indicators. Indirect indicators (such as Biological Oxygen Demand of freshwaters) need to be weeded out in a later stage.

6.1 The indicator list

Separate tables have been compiled for different 'sectors'. These are taken from the 'flower' model as presented by Ulla Pinborg (EEA, see fig. 1).

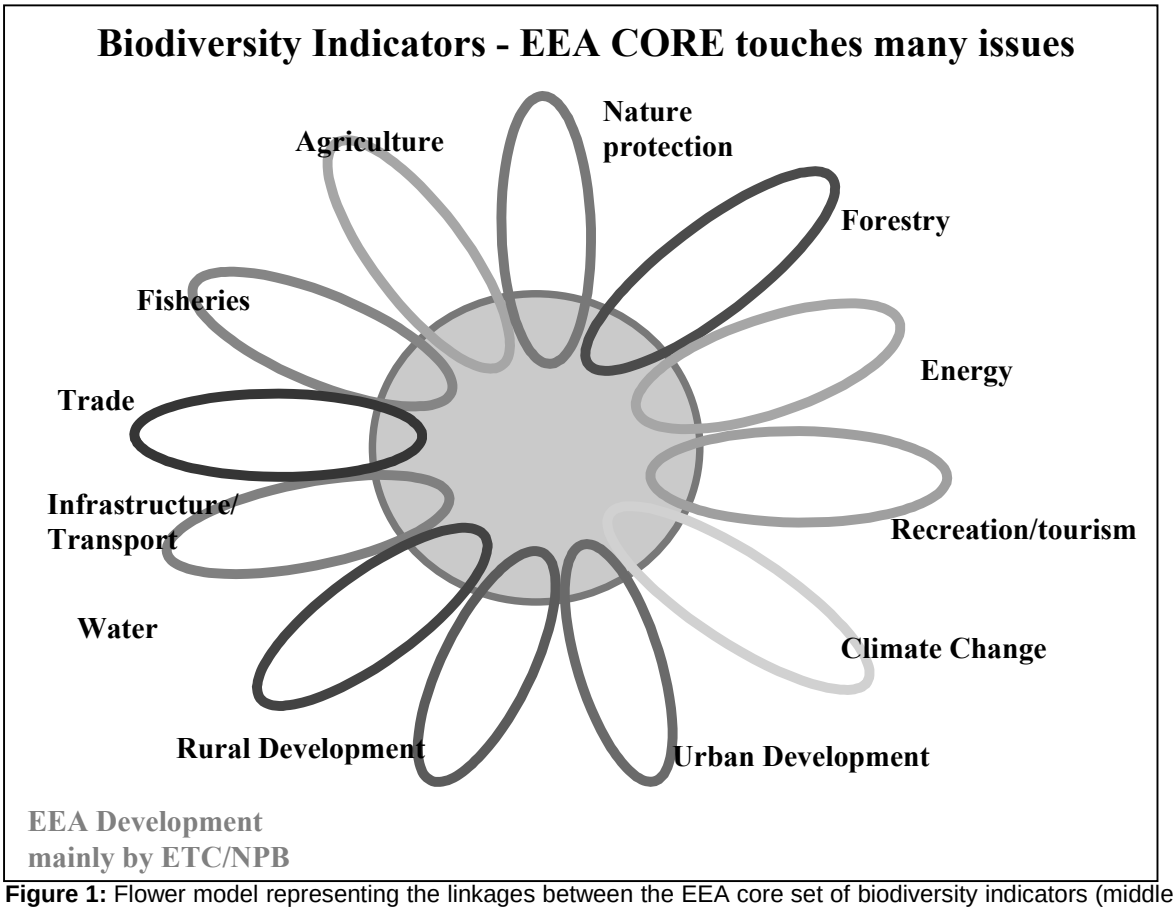

Figure 1: Flower model representing the linkages between the EEA core set of biodiversity indicators (middle circle) and the related sectors and issues (source: EEA).

Each table lists for each indicator the following characteristics:

No: chronological number of the indicator, as used for this study only.

DPSIR: indicates for which component of the DPSIR framework the indicator can be used. Based on expert judgement and open for debate.

Indicator name and definition: the name of the indicator as used in the information source. Some may be very similar but still have minor differences. Aggregation and clustering is required.

Policy question: which policy question this indicator may answer. Policy questions yet to be consolidated.

Use: indicates which stage of usage this indicator is in, whether it is scientifically developed only or implemented in monitoring activities already.

EEA type: related to 'Policy question' and giving an indication of the purpose of the indicator.

A descriptive indicator: 'What is happening?'

B performance indicator: 'Does it matter?'

C efficiency indicator: 'Are we improving?'

D total welfare indicator: 'Are we on the whole better off?'

Information source: bibliographical reference that mentioned this indicator.

Suitability: assessment of usefulness of the indicator for policy purposes. Currently based on one study only and applied to a few indicators only.

6.2 Indices

Throughout the list of indicators a number of indices have been listed. These are actually composed of an aggregation of indicators and may need special attention in the light of developing a core set of indicators or even the headline indicators, as desired by the European Commission. The indices listed are:

- Algae Index (no definition included) (UNEP 2001)
- Biological Quality Index (no definition included) (Bosch & Söderbäck 1997)
- Forest Physical Fragmentation (no definition included) (Bosch & Söderbäck 1997)
- Habitat Index: (undisturbed area + 0.25(partially disturbed area))/total area * 100 (Hannah et al. 1994a, b);
- Index for biodiversity and nature and cultural heritage values in the arable landscape (no definition included) (Bosch & Söderbäck 1997)
- Index of Biotic Integrity (IBI): used for aquatic ecosystems and based on multiple species-based metrics (Karr 1987);
- Living Planet Index (LPI): average of forest, freshwater and ocean index, each of which measures the average population trend over time of a sample of animal species (Loh 2000);
- National Biodiversity Index (NBI): index derived from data on richness and endemism in the four terrestrial vertebrate classes and vascular plants, adjusted to country area (SCBD 2001);
- Natural Capital Index (NCI): ecosystem quantity * ecosystem quality (ten Brink 2000);
- Relative Wilderness Index (no definition included) (UNEP 2001);
- Species risk index: number of endemic species per unit area in a community multiplied by the percentage of the natural community that has been lost (Reid et al. 1993, UNEP 2001)
- System Aqua Index: based on both prerequisites for and the actual biodiversity, using several physical, chemical and biological parameters (Bosch & Söderbäck 1997)
- Water Resource Vulnerability Index (no definition included) (UNEP 2001);
- World Bank/Gef Natural Capital Indicator (NCI): each country's part of the world's total of remaining natural areas, adjusted for by its biodiversity richness, which is defined as the actual number of species (vertebrates and vascular plants) plus the number of endemics per country (Rodenburg et al. 1995).

7 Conclusions

The study which forms the basis for the current report has led to a large amount of information on biodiversity-related indicators and their use in Europe and globally. The following conclusions of relevance to the next steps in developing a core set of biodiversity indicators can be derived from the survey:

1. There is an enormous variety of indicators that have been developed to assess some aspect of biodiversity on the national, international or global scale.
2. Many indicators have been proposed or developed, but only a limited number of them is actually in use on a long term basis.
3. This can be a criteria for the further selection of the EEA core set of biodiversity indicators
4. The DPSIR framework proves to be a good way of structuring thoughts on indicators but has its limitations in terms of interpretation. The classification of indicators according to this framework depends on the sector or issue under view.
5. Thoroughly applying the selection criteria listed in this report to all indicators listed in the annex may result in all indicators being filtered out as some criteria are contradictive. For the purpose of identifying policy-relevant indicators in the short term a simple selection criteria like 'public appeal' may be sufficient.
6. Given the complexity of biodiversity and the need for further scientific research and testing a two-way approach is recommended: select some indicators that can be used in the short term (even when imperfect) and meanwhile continue developing or fine-tuning other indicators for long-term use.
7. The policy questions will define the objectives for using indicators. Cross-referring a selected set of indicators to agreed policy questions will reveal existing gaps.
8. Many of the indicators use the same data pool for bringing across messages to a variety of targets (policy instruments, thematic reports, sectorial reports). It is important that existing international databases are further developed and maintained so as to ensure consistency in approach and message.

8 Acronyms and abbreviations

AG	Advisory Group
CBD	Convention on Biological Diversity
CMS	Convention on Migratory Species
COP	Conference of the Parties
CSD	Commission for Sustainable Development (of UN)
DPSIR	Driving Force – Pressure – State – Impact – Response (monitoring framework EEA)
DSR	Driving Force – State – Response (monitoring framework OECD)
EC	European Community
ECNC	European Centre for Nature Conservation
EEA	European Environment Agency
EIONET	Environment Information and Observation Network (by EEA)
ETC/ACC	European Topic Centre on Air and Climate Change (EEA)
ETC/NPB	European Topic Centre on Nature Protection and Biodiversity (EEA)
ETC/TE	European Topic Centre on Terrestrial Environment (EEA)
ETC/Water	European Topic Centre on Water (EEA)
ETC/WMF	European Topic Centre on Waste and Material Flows (EEA)
EU	European Union
EUROSTAT	European Statistical Office
GTOS	Global Terrestrial Observing System (FAO)
IBI	Index of Biotic Integrity
IFEN	Institut Français de l'Environnement
IUCN	International Union for the Conservation of Nature (The World Conservation Union)
JNCC	Joint Nature Conservation Committee (UK)
JRC	Joint Research Centre (of the EC)
MCPFE	Ministerial Conferences for the Protection of Forests in Europe
NGO	Non-Governmental Organisation
NINA	Norwegian Institute for Nature Research
OECD	Organisation for Economic Co-operation and Development
PEBLDS	Pan-European Biological and Landscape Diversity Strategy
ROD	Reporting Obligations Database (by EEA)
SAC	Special Area for Conservation (under EU Habitats Directive)
SBSTTA	Subsidiary Body for Scientific, Technical and Technological Advice (under CBD)
SCBD	Secretariat of the CBD
SPA	Special Protection Area (under EU Birds Directive)
TEPI	Towards Environmental Pressure Indicators (by EUROSTAT)
TERM	Transport and Environment Reporting Mechanism (EU)
UNCSD	United Nations Commission for Sustainable Development

UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNEP-WCMC	UNEP World Conservation Monitoring Centre
WCMC	World Conservation Monitoring Centre (under UNEP since 2000)

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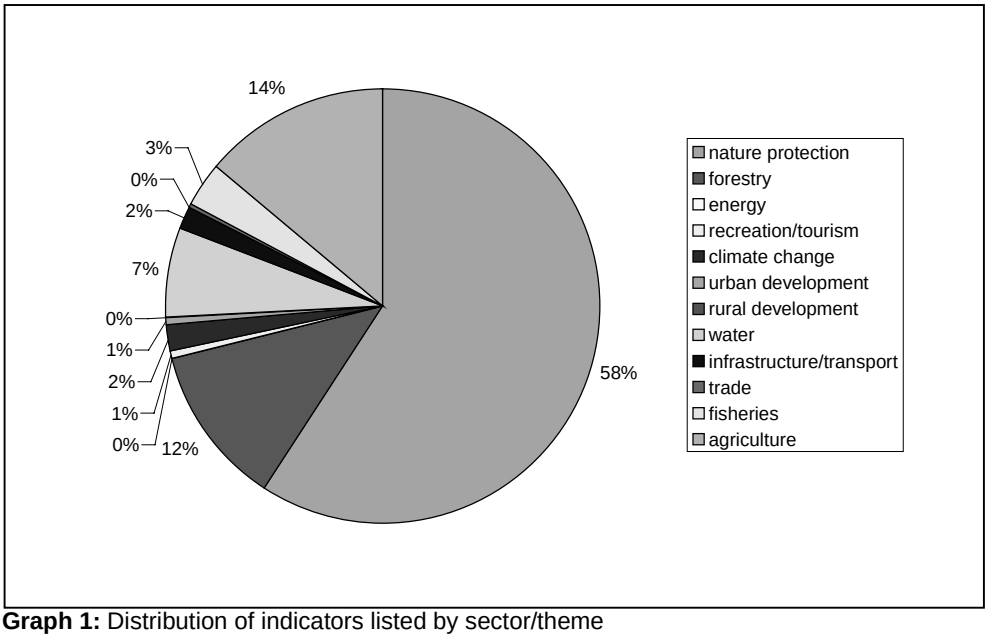
10 Annex: List of biodiversity-related indicators

The lists contain a total of 655 biodiversity-related indicators, distributed over 12 classes. The division between the classes is presented in the graph below.



Graph 1: Distribution of indicators listed by sector/theme