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Third ad hoc intergovernmental and multi-stakeholder meeting on an intergovernmental science-policy platform on biodiversity and ecosystem services
Busan, Republic of Korea, 7–11 June 2010
Item 3 of the provisional agenda[*]
Consideration of whether to establish an intergovernmental science-policy platform on biodiversity and ecosystem services

Current and future status of biodiversity and ecosystem service indicators

Note by the secretariat

Summary

The present note has been prepared by the United Nations Environment Programme World Conservation Monitoring Centre, with substantive input and comment from a range of stakeholders. Its purpose is to facilitate discussion on the relationship between the proposed intergovernmental platform for biodiversity and ecosystem services and current and planned approaches to developing and delivering biodiversity and ecosystem service indicators that support policy processes. It draws on the gap analysis set out in document UNEP/IPBES/2/INF/1 and for convenience reproduces some of the annexes to that document, which are set out as annexes I, II and VI–VIII to the present document. Those annexes are presented here as originally circulated in document UNEP/IPBES/2/INF/1, without editing. Annex V to the present document, as an excerpt from a pre-existing document, is also presented without editing.

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[*] UNEP/IPBES/3/1.

Contents

Background

1.   Since 2008, the United Nations Environment Programme (UNEP) has been facilitating intergovernmental and multi-stakeholder dialogue on the potential establishment of an intergovernmental science-policy platform for biodiversity and ecosystems services. An ad hoc intergovernmental and multi-stakeholder meeting on such a platform was held in Putrajaya, Malaysia, from 10 to 12 November 2008. The participants at that meeting agreed that there was a need to strengthen the interface between science and policy in respect of biodiversity and requested UNEP to prepare a gap analysis to guide further discussion. UNEP convened a second such meeting in Nairobi from 5 to 9 October 2009. At that meeting, a majority of the participants, having considered the UNEP gap analysis, continued to support the position that there was a need for a new intergovernmental mechanism to strengthen the science-policy interface on biodiversity and ecosystem services and called upon UNEP to prepare for a third and final ad hoc meeting at which participants would seek to agree on what to do next.

2.   In calling for the current meeting some participants at the second meeting requested the preparation of working documents and information documents addressing several key issues to facilitate further discussion and decision, in particular to ensure that any mechanism that might be adopted would not duplicate effort and would add value in a manner that could not be accomplished by existing mechanisms. The participants requested documents on the following subjects:

(a)   Current assessment landscape;

(b)   State of play in respect of existing and current indicators;

(c)   Current and planned capacity-building activities;

(d)   Options and criteria for a possible secretariat;

(e)   Possible platform governance structures;

(f)   Possible financing needs.

3.   The purpose of the present information document on biodiversity and ecosystem service indicators is to inform discussion and decision-making at the third meeting with regard to subparagraph 2 (b) above. The document discusses indicators themselves but its main focus is on indicator processes and lessons learned from them; as it is such processes on which a potential platform for biodiversity and ecosystem services might be built.

Introduction: the value and importance of indicators

4.   Indicators are tools for measuring and communicating progress. They are increasingly being used to inform policy on a range of scales and across sectors. They include both outcome-oriented indicators (those associated with status, trends and impacts) and process-oriented indicators (those associated with actions being taken).

5.   Indicators provide the evidence base for the magnitude, distribution, pace and direction of change of defined parameters. In some cases a single parameter, such as gross national income or atmospheric carbon dioxide concentrations, may be used in measuring progress, but often several parameters are included. These parameters are either presented separately in a framework of individual indicators, such as for the Millennium Development Goals, or combined into a single weighted index such as the Human Development Index.

6.   Decision makers need to be confident about the accuracy of the messages sent by indicators. Thus, good indicators rely on robust data and reliable data collection methods to provide information that is comparable in space and over time. While the terms "measures", "metrics" and "indicators" have been used interchangeably, in the present note they are used as follows:

(a)   Measure: a value that is quantified against a standard at a point in time;

(b)   Metric: a set of measurements;

(c)   Indicator: metrics presented in a meaningful way, usually by adding context.

7.   Indicators must be capable of communicating a message to policy makers and to other stakeholders. For example, the use of indicators and metrics in the assessments and communications of the Intergovernmental Panel on Climate Change has put the messages and the science on climate change

across to the Panel's target audiences in a clear and concise manner. The messages derived from the indicators and metrics play a key role in helping to persuade policy makers to take seriously the issue of climate change and to support the formulation of responses.

8.   Indicators are often used by Governments as barometers of progress. In their use of indicators Governments initially focused largely on measures of national economic growth such as GDP but in recent decades there has been an increasing focus on both social and environmental indicators. Organizations such as the World Resources Institute[1] and the Organization for Economic Cooperation and Development (OECD)[2] have championed the use of environmental indicators for national performance monitoring and reporting since the early 1990s. More recently a number of initiatives, including the Beyond GDP Initiative[3] and The Economics of Ecosystems and Biodiversity project,[4] are exploring the extent to which economic indicators can be adjusted to incorporate natural wealth and environmental sustainability and to track the economic consequences for human well-being of biodiversity and ecosystem service change.

9.   Indicators are also often used in conjunction with quantitative policy targets, on a range of scales. Many international policy processes have established strategic plans and work programmes with targets relating to various aspects of biodiversity and ecosystem services, which require appropriate indicators to track progress in their achievement. In a number of cases, programmes are already under way to develop such indicators; among the biodiversity-related multilateral environmental agreements, for example, particularly noteworthy are efforts are being made in the context of assessing progress in achieving the Convention on Biological Diversity target of significantly reducing the rate of biodiversity loss by 2010 and the implementation of the Convention on Wetlands of International Importance Especially as Waterfowl Habitat. In the broader social and economic realm, the Millennium Development Goals are a good example of a target-driven process in which indicators are used to track (and in some cases provide incentives for[5]) progress.

10.   Indicators may also be incorporated into assessment processes that use evidence bases to describe or explain patterns of change. For example, the Millennium Ecosystem Assessment used a series of indicators to underpin its message about the importance of and risks to the world's ecosystems and their services to human well-being. State-of-the-environment reports such as the Global Environment Outlook series and equivalent regional and national assessments use metrics and indicators to detect and illustrate change. The assessment landscape to which biodiversity and ecosystem service indicators contribute is very broad both geographically and thematically.

11.   While indicators are increasingly being developed and used at all levels, from global to regional to national, there are often concerns about whether they are fit for purpose. Issues include the adequacy of underlying data and the monitoring programmes that provide them, the conceptual basis (theoretical underpinning) of indicator frameworks and the scientific credibility of some indicators and the ways in which they are used. This has become a key issue of discussion in 2009 and 2010, for example, in the context of the redevelopment of the Convention on Biological Diversity strategic plan and the likely establishment of new goals and targets, but is common to all situations in which indicators are used to inform policy. This point is expanded on further below.

I.   State of play of biodiversity and ecosystem service indicators

12.   Many stakeholders are already collaborating in the development and delivery of indicators and there is a significant body of indicator experience to build upon. Indicator initiatives currently under way range from significant national programmes to regional and global initiatives. The indicators developed in these programmes are used for many purposes: parties to multilateral environmental agreements use them to meet reporting obligations; intergovernmental organizations use them to communicate on the state of biodiversity and sustainable development; and States and others use them

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1   E.g., Tunstall, D. & Mathews, J.T., *Moving toward eco-development: Generating environmental information for decision-makers* (World Resources Institute, Washington, D.C., 1991)

2   Centre for Cooperation with the European Economies in Transition, *Environmental Information Systems and Indicators: A review of selected Central and Eastern European Countries* (OECD, Paris, 1993).

3   See http://www.beyond-gdp.eu/.

4   See http://www.teebweb.org/.

5   Manning, R., *Using indicators to encourage development: lessons from the Millennium Development Goals* (Danish Institute for Environmental Studies, Copenhagen, 2009).

to review national policy implementation and to communicate the importance of key issues (such as threats to biodiversity) to the general public.

13.   The field of international indicator development is thus well-established, but a number of significant challenges exist. They include a number that are of particular importance to an intergovernmental platform for biodiversity and ecosystem services, including gaps in data availability and low priority accorded to monitoring programmes; areas in which indicators have yet to be developed and used; wide variation in the capacity to develop and use indicators; and concerns over the scientific credibility of some indicators currently in use. At the same time, the international community is regularly developing new targets through multilateral environmental agreements and other international processes for which new and existing indicators will be required to track performance and trends.

14.   A particular challenge lies in developing indicators to aid understanding of the essential links between biodiversity and human well-being. Many of the biome components that provide ecosystem services, including land, forests, oceans, seas and coasts and freshwater, have been assessed for some time. Nevertheless, the ecosystem service indicators realm is relatively new, building largely on the success of the Millennium Ecosystem Assessment in highlighting the importance of the natural environment for human health and well-being.

15.   The present chapter considers relevant international mandates for indicator development and use, the state of development of biodiversity and ecosystem service indicators and the coordination mechanisms and capacity development initiatives in place to support improved indicator development, uptake and use on global and regional scales.

A.   International mandates for biodiversity and ecosystem service indicators

16.   Chapter 40 of Agenda 21, the action plan adopted in 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, called upon countries and international, governmental and non-governmental organizations to develop indicators of sustainable development (which include indicators relating to biodiversity and ecosystem services) that could provide a solid basis for decision-making at all levels. Agenda 21 also called for the harmonization of efforts to develop such indicators.

17.   More recently, the United Nations Millennium Declaration (General Assembly resolution 55/2 of 8 September 2000) reaffirmed commitments to Agenda 21 and led to the adoption of the eight Millennium Development Goals. The Millennium Declaration called upon the General Assembly periodically to review progress in the implementation of its provisions and an official list of indicators was adopted by the General Assembly in 2001 to track progress in achieving the Goals. The list, revised in 2007, includes indicators relating to biodiversity and ecosystem services under Millennium Development Goal number 7, "to ensure environmental sustainability".

18.   The governing bodies of the biodiversity-related multilateral environmental agreements and participants in other international processes are increasingly adopting biodiversity and ecosystem service indicators to monitor the effectiveness of those processes, in many cases directly linked to the aims, objectives and targets set out in strategic plans. In most cases they have established reporting cycles that require indicators and other evidence of progress to be reviewed periodically.

19.   As a result there is a broad range of indicators that are currently either in use or being developed; some are of general applicability while others are specific to the needs of particular agreements or processes. The current situation in respect of these indicators is summarized in annex I to the present note.

20.   In addition, a number of bodies have been mandated to compile statistics and the metrics and measures that underpin indicators. The United Nations Statistics Division is the central mechanism for the compilation and dissemination of global statistical information, including the Millennium Development Goals indicators. Various specialized agencies are mandated to compile national statistics in particular thematic areas. For example, the Food and Agriculture Organization of the United Nations (FAO) maintains a statistical database on agriculture, nutrition, fisheries, forestry, land use and related topics, many of which are relevant to biodiversity and ecosystem services.

21.   Beyond these mandates, a range of entities including the World Bank, the OECD) and Development and the European Commission are committed to improving national measures of progress, wealth and well-being to include reference to social and environmental concerns. Others, including

FAO, the European Environment Agency and UNEP, are charged with undertaking periodic assessments pertaining more specifically to the environment, biodiversity and ecosystem services, which require those organizations to gather data and develop indicators.[6]

B. Current biodiversity and ecosystem service indicator landscape

22.   Several of the international processes described above have adopted indicator frameworks encompassing sets of defined indicators upon which they focus. The Millennium Development Goals are supported by a framework of some 60 indicators, including 10 under goal 7. Similarly, the United Nations Commission on Sustainable Development, established under chapter 38 of Agenda 21 to monitor progress in the implementation of Agenda 21, among other things, has a framework of indicators[7] that serve as reference points for countries to employ in developing or revising national metrics across 14 themes, including biodiversity and (indirectly) ecosystem services. The World Bank's World Development Indicators, from which it compiles an annual world development report, includes over 800 national indicators, including environmental indicator series on agriculture, energy, emissions, adjusted savings, land use, freshwater species and protected areas and water pollution. Finally, the Convention on Biological Diversity indicators framework, which the parties to the Convention adopted as a means of tracking progress towards the 2010 biodiversity target, includes a range of measures (29 currently being developed) under 22 headline indicators covering aspects of biodiversity, ecosystem services, threats to biodiversity and responses.

23.   The differences between mandates and processes requiring biodiversity and ecosystem service indicators notwithstanding, there is considerable overlap in indicator content between frameworks. Increasingly, different processes are using the same indicators, for example, indicators of protected area coverage, forest coverage, sustainable fish stocks and threatened species (see annex II to the present note) that are used (or recommended for use) under the Convention on Biological Diversity, the Millennium Development Goals and the Commission on Sustainable Development.

24.   This overlap in part reflects the fact that biodiversity and ecosystem service issues are of concern in a range of contexts. In reality many indicators, and in particular the outcome-oriented indicators (as opposed to those associated with process), are relevant beyond any individual multilateral environmental agreement or process. Most indicators currently being developed under the Convention on Biological Diversity, for example, draw on work that has been under way for a number of years on the status of and trends in biodiversity independent of work under the Convention. Similarly, a number of the indicators being developed for the Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (Ramsar Convention) are broadly relevant to anyone with an interest in wetlands.

25.   The overlap is also due in part to efforts to harmonize indicator use between processes. For example, the Commission on Sustainable Development indicator framework has been revised specifically to increase its coherence with those of the Millennium Development Goals, the Convention on Biological Diversity and other major sectoral indicator initiatives.[8] Equally, as the Ramsar Convention develops its own indicators it is benefiting from collaboration with other processes, learning from their experience and ensuring a degree of synergy. Annex III to the present note illustrates the areas of overlap identified between the proposed Ramsar indicators of effectiveness and three other indicator processes. Other multilateral environmental agreements, such as the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, and the Convention on the Conservation of Migratory Species of Wild Animals and some of its daughter agreements, are also looking at the extent to which indicators being used by other processes are relevant to their needs.

26.   Importantly, however, the suite of internationally developed biodiversity and ecosystem service indicators is limited, and significant gaps exist. In some cases, although many indicators may be defined and included in frameworks, there are few if any measures or methods to underpin them and thus no data to analyse and communicate. In other cases, no indicators are defined at all for certain elements of biodiversity and ecosystem services.

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6   See Swedish Biodiversity Centre, Strategic environmental assessments and ecosystem services, (Organization for Economic Cooperation and Development 2008).

7   Available at http://www.un.org/esa/sustdev/natlinfo/indicators/factsheet.pdf.

8   Available at http://www.un.org/esa/sustdev/natlinfo/indicators/factsheet.pdf, p. 2.

27.   Biodiversity indicators are most well-developed at the species level, while information on genetic or ecosystem changes is much patchier. The promise of remote sensing and the increasing quality and availability of satellite imagery notwithstanding, translating them into meaningful metrics of change for freshwater systems, drylands, coastal and marine habitats and other ecosystem types has proved challenging. Local and regional studies are available but have yet to be applied globally. Likewise, indicators of genetic biodiversity are slowly being compiled for domesticated and cultivated varieties of animals and plants but not yet for their wild relatives.[9]

28.   Well-developed indicators are those that are based on established methodologies, have reasonable global coverage (i.e., coverage of all continents except Antarctica, tropical and temperate regions and developed and developing countries) and for which there are sufficient time-series data (i.e., at least three data points spanning at least 10 years) to demonstrate changes over time (see annex IV to the present note).[10] Of the 29 measures being developed under the Convention on Biological Diversity indicator framework, only nine can be considered to be well-developed according to these criteria.

29.   With the increasing consideration of ecosystem services in public and private decision-making at all levels, it is apparent that current indicator frameworks are underdeveloped in respect of ecosystem services. Tracking conventional biodiversity and environment indicators alone is considered to be insufficient; indicators are therefore being developed that can also demonstrate how the benefits from biodiversity and naturally-functioning ecosystems are changing over time so that the policy relevance of biodiversity and functioning ecosystems can be more clearly demonstrated.

30.   Indicators for what are termed "provisioning services" in the Millennium Ecosystem Assessment are relatively well developed; on the international scale they draw largely on the work of FAO in compiling national statistics on forestry, fisheries and agriculture. Those and others, including for example the Marine Trophic Index being developed by the University of British Columbia, are being incorporated into numerous international indicator frameworks and assessment processes.

31.   Other ecosystem service categories defined in the Millennium Ecosystem Assessment – those for "supporting", "regulating" and "cultural" services – lag considerably in both conceptual and data-driven indicator development. Analyses of the current ecosystem service indicator landscape by the World Resources Institute[11] and others have highlighted this shortcoming at both the global and subglobal levels (see annex V to the present note).[12]

32.   Part of the challenge in respect of ecosystem service indicators is that the science on which they are based is continuing to evolve and is not yet strongly evidence-based. Except with regard to forests and, to a lesser extent, wetlands our understanding of how changes in biodiversity and ecosystem functioning affect the flow of ecosystem service benefits remains relatively weak.[13]

33.   Approaches that practitioners can employ in the use of ecosystem service measures for mapping, modelling and valuation, and for assessing the impact of ecosystem change on human health and well-being, are being developed under various initiatives. Examples of the former include the Natural Capital Project[14] and The Economics of Ecosystems and Biodiversity initiative. An example of the latter is Yale University's Environmental Performance Index.[15]

34.   Although very many economic, health and development indicators are in use, particularly on a national scale, few take into account dependence on biodiversity and ecosystems. The Convention on Biological Diversity framework includes as an indicator the health and well-being of communities that depend directly on local ecosystem goods and services; on a global scale, however, this indicator does

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9   M. Walpole and others, "Tracking progress towards the 2010 biodiversity target and beyond", *Science*, Vol. 325, No. 5947, pp. 1503–4 (18 September 2009).

10   Ibid.

11   C. Layke, "Measuring nature's benefits: a preliminary roadmap for improving ecosystem service indicators", World Resources Institute Working Paper, (World Resources Institute, Washington, D.C., 2009).

12   UNEP-WCMC (2009), "Ecosystem Service Indicators: Gaps, Opportunities and Next Steps". Workshop background paper, September 2009. Available from http://www.unep-wcmc.org/eap/DevelopingMainstreaming.aspx.

13   A. Balmford and others, "The economics of ecosystems and biodiversity: scoping the science", (European Commission 2008); S. Cox and B. Searle, "The state of ecosystem services", (The Bridgespan Group, 2009).

14   Information on the project is available at http://www.naturalcapitalproject.org.

15   Information on the index is available at http://epi.yale.edu.

not yet have an established methodology or measures associated with it.[16] In the Millennium Development Goals framework the achievement of goal 7, to ensure environmental sustainability, is not expressly linked to the achievement of the other goals; thus, the indicators for the goal are tracked separately. As noted in paragraph 8 above and section C. 6. of chapter I below, however, efforts are under way to incorporate ecosystem service valuation into national accounting systems and measures of national economic progress such as GDP. The extent to which such efforts will succeed depends on our ability to improve the definition and measurement of ecosystem services.

35.   In recognition of the fact that a wide range of stakeholders support and supply indicators and indicator data and that there is a need for the development of indicators and for building the capacity to adopt and use them, a range of coordination mechanisms have been established to support the various mandates for indicators described in section A above. Some of the more prominent such mechanisms are described in the next section along with some emerging, independent initiatives that are contributing to indicator research and development.

C.   Current international coordination mechanisms and approaches

36.   To ensure the effective use of indicators at the international level, coordination mechanisms are essential for bringing together key stakeholders. Given the complexities involved in understanding the state of biodiversity and ecosystem services, and the challenges in mainstreaming such issues, the involvement of key stakeholders is essential to ensuring that indicators are recognized and used effectively in policy-making processes. Each of the following coordination mechanisms is mandated or recognized by one or more international processes.

1.   Intersecretariat Working Group on Environment Statistics

37.   To encourage cooperation across the range of international and regional organizations engaged in the collection and compilation of environmental statistics the United Nations Statistical Commission, at its thirty-fourth session, empowered the United Nations Statistics Division to establish an inter-agency working group on environment statistics with the aim of coordinating and harmonizing the development of standards, methods, data collection and capacity-building programmes in respect of statistics on the environment.

38.   Pursuant to this grant of authority the Intersecretariat Working Group on Environment Statistics was established. The permanent members of the Working Group are entities that have well-established international programmes on environment statistics, including the direct and regular collection of comprehensive environment statistics from countries. The current members are the Statistics Division of the United Nations Department of Economic and Social Affairs, the United Nations Economic Commission for Europe, UNEP, the Statistical Office of the European Communities, FAO and OECD.

2.   Commission on Sustainable Development indicators of sustainable development

39.   The United Nations Commission on Sustainable Development has developed a set of indicators of sustainable development.[17] A first draft of such indicators was developed in 1995 for discussion by the Statistics Division and the Division for Sustainable Development of the United Nations Department of Economic and Social Affairs. The result was a set of 134 indicators arranged under 14 themes covering poverty, governance, health, education, demographics, natural hazards, atmosphere, land, oceans, seas and coasts, freshwater, biodiversity, economic development, global economic partnership and consumption and production patterns.

40.   From 1996 to 1999, 22 countries voluntarily pilot-tested the indicators. Overall, countries reported that the testing process had been successful, although they indicated that they had faced significant institutional challenges, especially in the areas of human resources and policy coordination. Integrating indicator initiatives into national development policies and transforming them into permanent work programmes ranked high among the recommendations for ensuring the success of the indicators. Most countries also found that the initial Commission on Sustainable Development indicator

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16   This indicator is currently being developed, in the course of which potential global datasets and case studies for national-level application are being examined.

17   Information is available at http://www.un.org/esa/dsd/dsd_aofw_ind/ind_index.shtml.

set was too large to be easily managed. Consequently, a revised set of indicators was produced, embedded in a policy-oriented framework of themes and sub-themes.

41. In 2005, the Division for Sustainable Development initiated a process to review the revised sustainable development indicators. In the five years that had passed since the previous revision, perspectives on indicators had evolved and experience in applying the indicators of sustainable development at the country level had grown considerably. Many countries had by then developed their own national indicators, often based on the Commission on Sustainable Development indicators. In addition, since the adoption of the United Nations Millennium Declaration in 2000 much attention had been paid, within the United Nations and by its Member States, to the development and use of indicators to measure progress in attaining the Millennium Development Goals.

42. Countries are invited to consider the revised Commission on Sustainable Development indicators[18] when reviewing existing or developing new national indicators of sustainable development. Guidelines on the indicators and their methodologies are provided by the Commission as part of a coordinated approach to indicator development. Collaborating entities have agreed to incorporate the indicators into relevant capacity-building activities and are cooperating with one another to ensure the coherence of the sustainable development indicators and other indicators such as those developed under the auspices of the Millennium Development Goals, the 2010 Biodiversity Indicators Partnership, the Hyogo Framework for Action on disaster reduction, the Global Forest Resources Assessment Programme and sustainable tourism indicators. The experience gained by countries in applying and adapting the revised Commission on Sustainable Development indicator set is taken into account in the continuous review of the revised sustainable development indicators.

3. Inter-Agency and Expert Group on MDG indicators

43. Work on indicators for tracking achievement of the Millennium Development Goals has involved the consolidation of the efforts of a number of entities to track progress towards achieving the eight goals and their associated targets[19] by 2015 at the global, regional and national levels. With clear targets, and a range of dedicated and data-rich datasets to draw from, the work on indicators for the Goals is an example of a well-coordinated and well-communicated inter-agency approach to indicator development and reporting. Of the 60 official indicators that have been developed, 10 pertain to goal 7 (on ensuring environmental sustainability) and directly concern aspects of biodiversity and ecosystem services. Four of those ten are also included among the indicators for the Convention on Biological Diversity and overlap significantly with the Commission on Sustainable Development indicators (see annex II to the present note). It has been recognized that maintaining biodiversity and ecosystem services is key to meeting most of the Goals.[20]

44. The development of the indicators for the Goals is coordinated by the Inter-Agency and Expert Group on MDG Indicators, which comprises various departments within the United Nations Secretariat, a number of United Nations agencies, funds and programmes, various government agencies and national statisticians, and other organizations concerned with the development of Millennium Development Goal data at the national and international levels, including donors and expert advisers. The Group is responsible for the preparation of data and analysis for monitoring progress towards achieving the Goals. It also reviews and defines methodologies and technical issues in relation to the indicators, produces guidelines and helps define priorities and strategies for supporting countries in data collection, analysis and reporting on the Goals. The United Nations Department of Economic and Social Affairs, using materials provided by the Group, produces reports on progress towards achieving the Goals.

4. 2010 Biodiversity Indicators Partnership

45. The 2010 Biodiversity Indicators Partnership[21] came into being when the Conference of the Parties to the Convention on Biological Diversity, in its decision VII/30, invited the UNEP World

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18   The current core set of indicators numbers 50, including a subset relating to biodiversity and others relating to aspects of ecosystem services, primarily provisioning services.

19   Information is available at www.un.org/millenniumgoals.

20   J. Sachs and others, "Biodiversity conservation and the Millennium Development Goals", *Science*, Vol. 325, No. 5947, pp. 1502–3 (18 September 2009); Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Synthesis*, (Island Press, Washington, D.C., 2005).

21   Information available at www.twentyten.net.

Conservation Monitoring Centre (UNEP-WCMC) to support the Convention secretariat in tracking progress in the achievement of the 2010 biodiversity target. From the outset, however, the Partnership has been of relevance to a number of multilateral environmental agreements and other processes concerned with the 2010 biodiversity targets and biodiversity change. Coordinating an international process takes time, cooperation and support from a wide range of agencies and resources. The Partnership brings together over 40 United Nations bodies and intergovernmental, non-governmental, academic and governmental organizations from around the world with the aim of providing the best available information on biodiversity trends to the global community. Several member bodies are also involved in the Inter-Agency and Expert Group on MDG Indicators.

46. The Partnership has three primary objectives: first, to generate information on biodiversity trends that is useful to decision makers; second, to ensure that improved global biodiversity indicators are available and are implemented; and, third, to enable capacity-building and improve the delivery of biodiversity indicators at the national level. In addition to key stakeholders that are involved at the international policy level, the secretariat of the Convention on Biological Diversity is directly involved in the partnership and Partnership outputs are made available to advisory and governance processes under the Convention. Other major bodies, such as the General Assembly, will also consider the partnership's outputs.

47. The suite of global indicators developed and delivered by partners is not limited to biodiversity status and trends, but also includes key measures of threats to biodiversity, measures relating to ecosystem services and benefits (primarily provisioning), and measures relating to policy responses. In total, 29 measures are supporting 17 headline indicators in various stages of development (see annex IV to the present note).

48. Responsibility for indicator development has been delegated to subsets of the partner organizations, with each subset focusing on its area of expertise. A secretariat draws together the outputs, synthesizes them into products appropriate for specific audiences and disseminates them. With oversight on governance and process provided by representatives from United Nations agencies, key data providers, donors and user groups, and scientific input from a range of experts across the biodiversity spectrum, the partnership aims to provide timely and definitive information to a range of decision makers. In addition, engagement with the secretariats of the other biodiversity-related multilateral environmental agreements and processes is helping to encourage and facilitate the identification of potential synergies between the indicators developed under the Convention on Biological Diversity and those used under other processes.

49. The Partnership, established in 2007 with support from the Global Environment Facility (GEF),[22] has leveraged additional support both through the organizations involved and from donors, including the European Commission, UNEP and the Government of Sweden. Feedback from an expert workshop on the 2010 biodiversity indicators and post-2010 indicator development[23] and other sources suggest that challenges notwithstanding the partnership has made a valuable contribution in respect of all three of its objectives and that it would be beneficial for a partnership of some form to continue beyond 2010.

5. Millennium Ecosystem Assessment follow-up partnership

50. The follow-up to the Millennium Ecosystem Assessment is coordinated by UNEP. As part of the follow-up a partnership has been established to take forward the legacy of the Assessment through, in particular, improvement of the knowledge base relating to ecosystem services and human well-being and enhanced engagement with the policy world. The partnership supports those carrying out subglobal assessments across the globe through guidance and training on various aspects of the Assessment, including practical aspects such as monitoring and the valuation of ecosystem services. Several partner agencies are beginning to explore how ecosystem service indicators can be better developed.[24]

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22 Information available at http://gefonline.org/projectDetailsSQL.cfm?projID=2796.

23 The report of the workshop is set out in annex IX to the present note. It is presented as prepared following the workshop and has not been edited by the secretariat.

24 See, for example, UNEP-WCMC, "Ecosystem service indicators: gaps, opportunities and next steps", (unpublished workshop report, September 2009). Available from http://www.unep-wcmc.org/eap/DevelopingMainstreaming.aspx.

6. Beyond GDP and similar initiatives

51. The World Bank and the United Nations Statistical Office are collaborating in efforts to strengthen the existing system of economic and environmental accounts[25] by including explicit estimates of the value of ecosystem services. In addition, the World Bank is spearheading efforts to develop measures of inclusive wealth.[26] These efforts involve the development of indicators of changes in the value of ecosystems. The Beyond GDP[27] initiative of the European Commission involves a range of agencies that are developing indicators relating to what is termed "adjusted" gross domestic product, environmental accounts and quality-of-life measures and are working to incorporate the United Nations Human Development Index and the concepts of "ecological footprint" and "genuine savings" into metrics.

7. Academic and scientific networks

52. Beyond the institutional coordination mechanisms described above, there are various scientific networks working to coordinate the improved delivery of scientific information relevant to indicator development. The wider scientific community does not always find it easy to engage with formal processes. Global networks and programmes such as Diversitas, the Global Biodiversity Information Facility and the Group on Earth Observations Biodiversity Network have the potential to provide a voice for that community and to contribute significantly to indicator development by expanding the research and knowledge base and stimulating coherent and concerted efforts by researchers and academic institutions.[28]

53. Particularly important for increasing access to information are the development of national and regional information networks, with the latter facilitating and promoting the development of the former. For example, the Inter-American Biodiversity Information Network, which was initiated at least in part with the intention of supporting decision-making, is beginning to play a valuable role in building capacity for data management and sharing at the national and regional levels. At the national level organizations such as the South African Environmental Observation Network and the National Commission for the Knowledge and Use of Biodiversity in Mexico are examples of networks that provide some of the same functions at the national level, helping to ensure access to data and information relevant for decision-making. Both regional and national networks are actively supported by international programmes and networks which facilitate and promote increased access to data.

D. Regional indicator coordination approaches

54. Regional indicator approaches are increasingly being developed and implemented to support regional processes and to supply regional input to multilateral environmental agreements and international processes. Some examples are provided here.

55. Various United Nations regional commissions support the development and delivery of Millennium Development Goals indicators and reporting and sit along with other international bodies on the Inter-Agency and Expert Group on MDG Indicators. For example, the United Nations Economic and Social Commission for Asia and the Pacific works with the United Nations Development Programme (UNDP) and the Asian Development Bank to coordinate the production of annual regional Millennium Development Goals progress reports and to support Governments by providing relevant information and facilitating regional cooperation.[29]

56. The Streamlining European 2010 Biodiversity Indicators project[30] has been designed around the Convention on Biological Diversity indicators framework and is being used to monitor the status of and trends in biodiversity and ecosystem services across the entire pan-European region. The project is

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25   Information available at http://unstats.un.org/unsd/envaccounting/seea.asp.

26   These efforts are building on the findings and recommendations set out in a number of reviews. See, for example, P. Dasgupta, "Nature's role in sustaining economic development", *Philosophical Transactions of the Royal Society, Vol. B2010* 265, pp. 5–11.

27   Information available at http://www.beyond-gdp.eu/.

28   On smaller scales, see for example the Natural Capital Initiative and the Cambridge Conservation Initiative in the United Kingdom of Great Britain and Northern Ireland in bringing together local academics and agencies to improve the knowledge base on ecosystem services, including measures and indicators.

29   Information available at http://www.unescap.org and http://www.mdgasiapacific.org.

30   See http:// biodiversity-chm.eea.europa.eu/information/indicator/F1090245995/.

being led by the European Environment Agency working with a coordination team that includes key stakeholders. The project is implemented through collaboration with relevant agencies in each country based on well-defined, collaboratively-developed indicators. Recently, as is reported in annex VI to the present note, a working group has been reviewing use of the indicators and made a number of recommendations on their use and on the development of improved indicators.

57. The Association of Southeast Asian Nations (ASEAN) Centre for Biodiversity is an intergovernmental regional centre of excellence which facilitates cooperation among its members and with relevant national Governments and regional and international organizations on the conservation and sustainable use of biological diversity and the fair and equitable sharing of benefits arising from such use. The Centre supports ASEAN Governments in areas identified in multilateral environmental agreements such as the Convention on Biological Diversity, the Convention on the International Trade in Endangered Species of Wild Fauna and Flora, the Ramsar Convention and the Cartagena Protocol on Biosafety to the Convention on Biodiversity, to which the majority of the ASEAN member States are parties. In relation to the fourth national reporting cycle of the Convention on Biological Diversity, the Centre organized a series of workshops on biodiversity indicators in late 2008. The workshop participants proposed and refined a long list of biodiversity indicators relating to the Convention on Biological Diversity global goals and targets, in the process assessing their relevance to national priorities and data availability. The indicators were strategically selected to address key issues relevant to the Convention on Biological Diversity, without duplicating efforts already undertaken or planned elsewhere, and to complement global indicators evolving within other environment and development efforts such as those under the auspices of UNDP and the United Nations Framework Convention on Climate Change.

58. The Circumpolar Biodiversity Monitoring Programme works with over 60 partners to harmonize and enhance long-term Arctic biodiversity monitoring efforts to improve the ability to detect, understand, report on and respond to significant trends and pressures. The information gathered under the programme will be used to assist decision-making from the global to the local levels. A key component of the programme is the development of a set of biodiversity indices and indicators[31] on the status of and trends in key elements of the Arctic's living resources. The programme is the cornerstone programme of the Arctic Council's Conservation of Arctic Flora and Fauna Working Group and feeds into the Arctic Biodiversity Assessment.

E. Uptake of indicators at the national level

59. The development and use of biodiversity-related and environment-related indicators at the national level has been increasing over the years, focusing primarily on support for policymaking and monitoring. Many programmes in this area have developed independently and there is therefore quite a wide range of approaches; some are well-developed and sophisticated, while others remain in their infancy.

60. The importance of specific national indicators is well-recognized. A review of national-level implementation of the Millennium Development Goals[32] found that countries with an evidence-based approach to managing their environmental resources make the most progress towards the goal of environmental sustainability. Such an approach requires that countries do not mechanically adopt global targets and indicators but rather adapt them to national development policies and priorities, local context and the specific characteristics of individual ecosystems. Recognition of the need for such an approach notwithstanding, national-level reporting on Millennium Development Goal number 7 is hampered by unreliable and inaccessible data, a lack of statistical capacity, a lack of public awareness, inadequate legislative and regulatory frameworks, inadequate human resource capacity and a need for more partnerships.[33]

61. In the biodiversity arena, since the second meeting of its Conference of the Parties in 1995, the Convention on Biological Diversity has been promoting the use of indicators at the national level to monitor the status of biodiversity. With the Conference's 2004 adoption of decision VII/30, by which it adopted the indicator framework for the 2010 biodiversity target, parties and Governments were invited to use existing national indicators or to establish new indicators to assess progress towards the

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31   Information available at http://cbmp.arcticportal.org/images/stories/pdf/low_res_5-year_plan_cbmp_implementation_plan.pdf.

32   United Nations Development Programme, "Making progress on environmental sustainability: lessons and recommendations from a review of over 150 MDG country experiences", (2006).

33   Ibid.

achievement of national and regional targets. The use of biodiversity indicators at subglobal levels was not necessarily expected to follow the Convention's framework and was intended to be sufficiently flexible to be tailored to specific national priorities. As a result, while many of the more developed global indicators are based on nationally captured data, global and national indicator processes are not fully aligned. National and regional level indicators are inevitably more closely linked to priorities and needs at that level.

62.   A review of national reports under the Convention on Biological Diversity (see annex VII to the present note) reveals that there is widespread recognition of the importance of national indicators and that a wide range of indicators that respond to all seven focal areas established by the Conference of the Parties in decision VII/30 have been developed or are currently being developed. In general, however, indicators relating to the first of the three objectives of the convention – conservation of biological diversity – are far more commonly used than are those relating to the other two objectives – sustainable use of genetic resources and fair and equitable sharing of the benefits arising from the use of genetic resources. Meanwhile there is wide variation in the degree of development and use of indicators across countries owing to, among other things, capacity or financial limitations, lack of data as a result of inadequate or under-funded monitoring and assessment processes and insufficient internal communication and information sharing.

F.   Capacity-building for indicator development and use

63.   As the need for indicators for assessing and managing progress in meeting both national and international biodiversity targets is increasingly understood at the national level, so is the need to build the capacity to develop and use indicators successfully for various purposes, including to use them in a harmonized manner to meet a range of reporting requirements. At the recent first global intergovernmental and stakeholder consultation on the fifth Global Environment Outlook assessment, representatives highlighted data collection, monitoring and use as areas where the need for capacity-development at the national level was the most pressing. There is a significant opportunity for bilateral cooperation and facilitated sharing of experience in the development and use of indicators. There are also opportunities, however, based on international experience and international facilitation of the sharing of experience between countries.

64.   The Commission on Sustainable Development indicator programme is supplemented by an associated capacity-building programme, focusing largely on Latin America and the Caribbean. Work has been carried out to assess and establish baselines and needs in respect of information management systems for sustainable development, to establish a regional pilot network of national and regional institutions involved in information management in the region, to develop training materials on information management systems for training of trainers and to providing in-country training on information management systems.

65.   National capacity development is also an important element of the Millennium Development Goals indicator process. Since the periodic assessment of progress towards the Goals started, the international statistical community has been concerned about a lack of data adequate to monitor trends in many developing countries and to inform the global monitoring and political debate. Countries face many challenges in monitoring the Goals indicators, and reporting relevant to goal 7 is particularly weak.[34]

66.   The Inter-Agency and Expert Group on MDG Indicators regularly reviews and discusses countries' needs to build capacity to produce and analyse Goals and development indicators and works with national statistical offices to identify capacity-building priorities and to facilitate the coordination of technical assistance activities. A number of projects and activities have been launched by the Group's member agencies and organizations, ranging from advocacy for the strengthening of official statistics through good statistical governance to knowledge transfer and technical training on data collection, analysis and dissemination. UNDP in particular has focused heavily on national-level monitoring and reporting.[35]

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34   Ibid.

35   See, for example, "Monitoring Country Progress Towards MDG-7: Ensuring Environmental Sustainability*", *Practice Note series (United Nations Development Programme 2005), which sets forth principles and approaches in respect of enhancing country-level monitoring and reporting on environmental sustainability.

67.   The 2010 Biodiversity Indicators Partnership, in supporting the Convention on Biological Diversity reporting process, has held a series of regional workshops to assist countries in the development and use of biodiversity and ecosystem service indicators, including those incorporated into the Millennium Development Goals process. The workshops, which have been organized by UNEP-WCMC on behalf of the partnership, build on the experience of a number of organizations in the partnership in global-indicator-development processes. They also draw heavily on case studies from current successful national approaches and encourage peer-to-peer experience exchange. The workshops have led to the production of guidance materials[36] aimed at national and regional bodies. Funding for the workshops and the production of the guidance materials has been provided by GEF, the United Nations Development Account and UNEP. Annex VIII to the present note sets forth observations and recommendations based on the experience of UNEP-WCMC in organizing the workshops in a number of developing countries.

II.   Reviews of progress in developing and using biodiversity and ecosystem service indicators and identification of future directions

68.   Various reviews have been carried out on the development, adoption and policy relevance of indicators, particularly at the national level. Two major such reviews are discussed here. The first is an independent review of the impact of the Millennium Development Goals indicator framework.[37] The second is an expert and stakeholder review of the use and effectiveness of, and gaps in, the 2010 biodiversity indicators (see annex IX to the present note). These reviews are particularly relevant to the discussions on an intergovernmental platform for biodiversity and ecosystem services because they provide an assessment and peer review of the existing mandated indicator processes that most broadly cover biodiversity and ecosystem services. Moreover, both the indicator framework associated with the Convention on Biological Diversity strategic plan and the indicators associated with the Millennium Development Goals are well-developed global-scale frameworks. Both also benefit from the support of technical expert bodies and continuing coordination of international efforts.

69.   The two reviews have resulted in a number of important findings regarding data availability and coverage, scientific peer review and validation, communication of what indicators reveal and investment in capacity-building that apply across many processes. The present chapter outlines these key findings.

70.   Indicators are seen as a valuable means of presenting data in formats that are meaningful in the context of policymaking. An ideal set of indicators would be broad enough to address the full range of biodiversity and ecosystem service issues, small enough to be manageable and simple enough to be applied consistently and affordably in different regions over long periods of time. At the same time countries need indicators that meet their own needs while contributing to the global picture.

71.   The existence of international policy commitments such as the Millennium Development Goals and the 2010 biodiversity target, and associated mandates and processes to support indicator development and use, have had a significant impact by encouraging the collection and use of data and leading to great improvements in interagency collaboration on data and indicators. This is attributable in part to the fact that such commitments and processes have drawn much-needed attention to the lack of relevant data sets from which indicators can be calculated.

72.   The reviews also highlight, however, a number of persistent challenges to the effective development and use of indicators.

73.   Data availability poses one such challenge. While many possible indicators have been suggested, not all are developed or underpinned by metrics and measures. Most indicators being developed for use in the context of biodiversity and ecosystem services are being adapted from existing datasets, which may not have been compiled for tracking biodiversity or ecosystem service change and may therefore be imperfect proxies. Furthermore, the taxonomic, ecosystem, geographic and thematic coverage of many indicators is incomplete, and more focus is needed on baselines and long-term data availability. Links between indicators at different scales (global, regional, national and local) need to be better considered. For indicators compiled from subglobal (often national) datasets, data consistency across different sources can be an issue.

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36   Information available at http://www.bipnational.net.

37   Manning, *Using Indicators to Encourage Development* (see footnote 10, above).

74.   Transparency and scientific credibility pose another challenge. A balance must be struck between the ideal and the pragmatic, but at present there are a number of shortcomings in respect of transparency and credibility. Thus, few global indicators have been subjected to independent and transparent peer review or are based on published methodologies. There is no clear process or criteria for evaluating scientific rigour; peer review is neither universal nor undertaken according to uniform standards; and there is often no assessment of certainty or rigour. The indicators and their methodologies and metadata are not sufficiently described or documented, and the associated data are not always accessible to others. The representativeness and adequacy of the underlying data from which the indicators are derived needs to be clarified and improved. Current indicators often lack reference values (baselines) and other ways of quantifying the significance of changes.

75.   The relevance of indicators represents a third challenge. It is essential that indicators contribute to an understanding of the impact of policy. An important shortcoming to date has been a failure to show how indicators can be linked to tell a story, revealing the potential connections between responses and outcomes, in a way that is potentially far more powerful than using indicators in isolation. The frameworks within which indicators are situated need a clearer and better-documented logical structure that emphasizes benefits to people. Such a structure could usefully be based on an overarching conceptual framework such as the driver-pressure-state-impact-response (DPSIR) framework.

76.   Communication is yet another challenge. Indicators are not fully effective if there is no proper understanding of the role and use of communication in their use. Communications strategies must focus on specific audiences and ensure that indicators are understood and relevant to users to maximize the likelihood that they will to be acted upon.

77.   Lack of capacity to develop and use indicators is another challenge. It is widely recognized that greater investment in the development of the capacity to collect and assimilate policy-relevant data and to present it to decision makers is an urgent priority, especially at the national level.

78.   In addition, as highlighted by the gap analysis undertaken for the ad hoc working group on the intergovernmental platform for biodiversity and ecosystem services,[38] tracking conventional biodiversity indicators alone is insufficient; indicators will also need to be developed that can demonstrate how the benefits of biodiversity and naturally-functioning ecosystems are changing over time so that the relevance of biodiversity to policy can be more clearly understood. Particular challenges for ecosystem service indicators include the fact that for most ecosystem services there are currently few, if any, suitable indicators for monitoring the actual delivery of services and that there are limited or no data available. Furthermore, the indicators required will need to communicate policy-relevant information about a complex issue in respect of not only the status of and trends in ecosystem services but also flows of such services, that is, who benefits from them, and where. Finally, not all ecosystem services are quantifiable. For example, the aesthetic benefits that people receive from ecosystems differ greatly between people and are dependent on a number of different factors that cannot readily be valued or otherwise quantified.

III.   Key messages focusing on needs

79.   The present chapter summarizes the key messages that arise from the present note's review of biodiversity and ecosystem service indicator processes and from the other reviews referred to herein. Participants at the current meeting may wish to take the following messages into account in their deliberations:

        (a)   *Established need*. Biodiversity and ecosystem services indicators are needed on a variety of scales for a variety of uses from measuring national progress to monitoring achievement of international commitments; they are also needed for a range of assessment processes. Currently, however, their development and the metrics and measures that underpin them are incomplete. There are gaps in the thematic and geographic coverage of biodiversity indicators, and in particular in the development of ecosystem service indicators other than for provisioning services. Furthermore, current indicators are not yet clearly showing the links between biodiversity and ecosystem services and human well-being;

        (b)   *Experience to date*. There is already substantial experience in developing and using biodiversity and ecosystem service indicators at all levels across a range of processes and initiatives. There is some degree of coordination through existing multi-stakeholder partnerships, with key agencies contributing data and indicators to a range of processes. There are also efforts to harmonize the

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38   UNEP/IPBES/2/INF/1, para. 168

indicators used on the national, regional and global scales. There is still much scope, however, to integrate further the efforts of the scientific community with international agencies;

(c)   *Good science*. The process of indicator development should follow best available scientific practices that would allow the development of clear and credible indicators, including a clearly documented, peer-reviewed, published methodology for each indicator; access to underlying data; data quality control; subject to initial testing and periodic independent review of results, in order to obtain meaningful, scientifically sound indicator results;

(d)   *Indicator theory and conceptual frameworks*. Individual indicators are often defined and developed as parts of larger frameworks of indicators, with each indicator relating to a different issue within the bigger picture. It is important to be able to articulate clearly how different indicators in a framework fit together, particularly when using indicators to elucidate policy impacts or to identify why certain targets have or have not been met. For example, a framework of indicators including measures relating to threats to biodiversity, the state of biodiversity, ecosystem services, human well-being and policy responses is most useful to decision makers when the effect of changes in one indicator on changes in others is well understood and can be easily explained. The relationships between the indicators in any framework should be clearly explained and documented, including their scientific basis and any theoretical assumptions underling them;

(e)   *Building capacity*. National capacity for framework application, indicator development, data collection and information management must be developed and adequately funded to strengthen countries' ability to develop, monitor and communicate in respect of indicators in a participatory, sustained and integrated way and to link with other processes such as multilateral environmental agreements at all levels. The development of appropriate portals, including clearing-house mechanisms, for appropriate data sharing and review would greatly support the improvement of access to and availability of data. Programmes that aim to increase the development and use of biodiversity and ecosystem services indicators at the national level, drawing on both national and international experience, are already under way and could be further streamlined and expanded;

(f)   *Communicating indicators*. The importance of developing communication strategies for indicators to inform policy discussions and ensure the effective communication of the messages derived from indicators to all sectors must be recognized;

(g)   *Collaboration and facilitation*. It would be highly beneficial if the research and policy communities worked together in a more coordinated way, building on existing collaborative initiatives and experience, to continue to design appropriate indicators, to implement the sustained monitoring programmes that are needed to ensure the availability of data and indicators for the long run, to develop appropriate communications strategies to ensure that indicators are used well, and to facilitate improved use of indicators at the national level. A clear and open process that allows all stakeholders to engage in the manner that seems best to them would support such an outcome;

(h)   *A global partnership*. In addition, efforts should be made to consider the involvement of all potential developers and users of indicators to encourage a harmonized approach to such complex and dynamic subjects as biodiversity and ecosystem services. The use of indicators to monitor the effectiveness of multilateral environmental agreements and other global initiatives is increasingly emphasized, which has implications for investment of time, funding and expertise. The resource burden, at all levels from the global coordinating systems to national level development and use, will need to be considered when promoting indicator uptake in order to achieve the greatest success.

Annex I

Overview of a range of indicator processes for the global biodiversity-related agreements and other related agreements and programmes

The table below is taken from document UNEP/IPBES/2/INF/1. It provides an overview of a range of global indicator processes that relate to tracking biodiversity status and trends. The table does not provide a comprehensive list of indicator initiatives, data sources and responsible organizations, as such a list would be beyond the scope of the present note. A complete review along those lines would be appropriate once an intergovernmental platform for biodiversity and ecosystem services featuring an indicator-based monitoring system was adopted.

Agreement	Mandate	Current situation
Convention on Biological Diversity	In 2002, in decision VI/26, CBD Parties agreed "*to achieve by 2010 a significant reduction of the current rate of biodiversity loss at global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth*". Assessment of progress in achieving the 2010 biodiversity target and sub-targets is addressed in decisions VII/30 and VIII/15, which also introduce and elaborate a framework of 22 headline biodiversity indicators under seven focal areas, to be used to track progress towards the achievement of these targets.	When the framework was adopted in 2004, some of biodiversity indicators were ready for immediate use at the global scale, but others required further development and testing. Both mature and emerging indicators are being tracked and developed at the global scale by a wide range of scientific organizations as part of the CBD-mandated 2010 Biodiversity Indicators Partnership (2010 BIP)[39] co-ordinated by UNEP-WCMC. The 2010 BIP has established an independent Scientific Advisory Body to provide scientific oversight, review and validation of the indictor methodologies, and has recently convened an international expert workshop to review the use of indicators so that lessons can be learnt for the Post-2010 targets and indicators (see below).
Ramsar Convention on Wetlands	The Ramsar Convention adopted a set of eight outcome-oriented indicators (with 11 sub-indicators) to monitor effectiveness of the implementation of the Convention[40].	Methodological development for the Ramsar indicators varies. Some will be based on national reporting, others will use different sources. Workshops and focus groups are being carried out with scientific experts and agencies to further this development, however in some cases gaps will remain due to a lack of time and resources to access available data[41]. The Ramsar indicators and sub-indicators have substantial overlap with the CBD indicators. Institutionally there is also close engagement between CBD and Ramsar indicator processes. Through participation in expert group meetings, members of the STRP and Ramsar Secretariat have contributed to the development of the CBD indicators, whilst the Ramsar Indicators are being developed in close partnership with UNEP-WCMC and the 2010 BIP.
Convention on Migratory Species	The CMS strategic plan includes 31 indicators under four objectives[42]. Besides process indicators relating to the implementation of the CMS strategy, the CMS indicator framework includes a number of impact indicators relating to the status and trends in, threats to, and level of protection of, migratory species.	Development of migratory species indicators was recognized at CMS COP8 as an appropriate step towards an assessment of the contribution of the Convention in the achievement of the 2010 target. In this regard the CMS Secretariat is working closely with the CBD Secretariat and the 21010BIP in order to adopt indicators that contribute to measuring the achievement of the 2010 Target. Within this process, progress has been recently made in exploring the suitability of two existing indices, Red List Index and the Living Planet Index.

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39   www.twentyten.net.

40   Ramsar (2008). Further development of indicators of effectiveness of the implementation of the Convention. Ramsar COP10 DOC.23, paragraphs 2–5.

41   Personal communication from the Ramsar Secretariat.

42   CMS strategic plan 2006-2011. UNEP/CMS/Resolution 8.2, Nov 2005.

Agreement	Mandate	Current situation
Convention on International Trade in Endangered Species of Wild Fauna and Flora	CITES has a Strategic Vision 2008-2013, that includes 40 indicators under 16 Objectives[43]. These indicators are almost entirely process-based, with no indicators relating directly to the status or trends in biodiversity. Despite the general view that indicators should be outcome-focussed there were challenges in reaching collective agreement on what they should be.	The CITES Secretariat is a member of the 2010 BIP and are collaborating on an indicator of the status of species in trade, however this is not being utilised by CITES and is purely a contribution to assessing progress towards the CBD 2010 target. However an additional indicator (3.4.1) is now being formulated, in consultation with IUCN, on CITES' conservation impact. Although CITES gathers and holds a significant amount of population status and other information in documentation related to amendment proposals, the Review of Significant Trade and certain special reports, this data has not been easily searchable. A new on-line tool now being developed with UNEP-WCMC will make the Review of Significant Trade information easier to access and search. CITES needs to partner with other organizations in order to obtain the population status and distribution information that it does not regularly collect through its annual, biennial or special reports.
World Heritage Convention	The World Heritage Convention has adopted a results-based management framework with 12 indicators under four strategic objectives[44]. These include two indicators that relate to the state of conservation of sites, and one relating to the level of threat to sites.	Member states are encouraged to take up the use of the indicators in their reporting but an analysis of the extent to which they have done so in reporting to date has not been made.
UN Convention to Combat Desertification	UNCCD is beginning to consider how to better incorporate biodiversity into its areas of work, including the development of indicators.	At the latest COP Parties considered both indicators and reporting based on discussions that had taken place in the CRIC. Both the SCBD and the 2010 BIP participated in the UNCCD Conference of Parties in September 2009, and a GEF-supported project on implementing performance indicators is underway.
Millennium Development Goals	The MDGs are a set of eight goals, with associated time-bound targets, adopted by nations in order to reduce poverty in all its forms. Goal 7, to ensure environmental sustainability, incorporates four targets including the CBD 2010 Biodiversity Target. Four of the CBD biodiversity indicators within the 2010 BIP are included as MDG indicators (two under Target 7a and two under target 7b).	The UN Statistical Division maintains a database of MDG indicator data[45] that is disaggregated by region and country, and by year. One of the major challenges is rationalising national data (from national reporting) with global data from the international agencies. There are ongoing efforts to achieve this. The same issues apply, regarding national capacity to measure and report on the indicators under MDG-7, as for the CBD indicators.
United Nations Commission on Sustainable Development (CSD) Indicators of Sustainable Development	The United Nations Commission on Sustainable Development (CSD) was established in December 1992 by General Assembly Resolution A/RES/47/191 as a functional commission of the UN Economic and Social Council, implementing a recommendation in Chapter 38 of Agenda 21, the landmark global agreement reached at the June 1992 United Nations Conference on Environment & Development held in Rio de Janeiro.	The CSD Indicators serve as reference for countries to develop or revise national indicators of sustainable development. Previous editions of the CSD indicators were published in 1996 and 2001, the current edition is 2007. The framework contains 14 themes and coherence with Millennium Development Goal (MDG) indicators and major sectoral indicator initiatives has been increased

43   CITES (2008). Strategic Vision 2008-2013: Development of Indicators. SC57 Com.6.

44   WHC (2006). Performance Indicators for World Heritage. WHC-06/30.COM/12.

45   See unstats.un.org/unsd/mdg/Default.aspx.

Agreement	Mandate	Current situation
Streamlining European 2010 Biodiversity Indicators (SEBI2010)	Both the European Union and pan-European processes have adopted the target of *halting* the loss of biodiversity by 2010. SEBI2010 is a pan-European initiative led by the European Environment Agency (EEA) to ensure the development and uptake of a common set of biodiversity indicators to track progress towards this target.	SEBI2010 has 26 indicators under seven focal areas[46], and not unsurprisingly there is considerable overlap with the content of CBD indicator framework. Indeed this was actively worked towards, and the project coordination team included not only European agencies but also UNEP-WCMC with the intention of ensuring close linkages with other initiatives. SEBI2010 also works closely with the 2010 BIP
Circumpolar Biodiversity Monitoring Programme (CBMP)	The CBMP was established to provide an integrated and sustained Arctic Biodiversity Monitoring Network. The CBMP functions as an international forum of key scientists and conservation experts from all eight Arctic countries, the six international indigenous organizations of the Arctic Council, and a number of global conservation organizations[47].	The CBMP is planning to develop 13 indicators during 2008-2010 and a further nine indicators in 2011-2012. The CBMP indicators and indices will facilitate the reporting of the Arctic's progress towards the Convention on Biological Diversity's 2010 target to reduce the rate of loss of biodiversity. In that regard there is significant correspondence with the CBD indicator framework.
African Eurasian Waterbird Agreement (AEWA)	The African Eurasian Waterbird Agreement (AEWA) is a stand-alone Multilateral Environmental Agreement (MEA) concluded in 1995 to improve the conservation and management of waterbirds in the African-Eurasian region on Appendix II of CMS. AEWA has adopted a strategic plan for 2009-2017, the goal of which is "*to maintain or to restore migratory waterbird species and their populations at a favourable conservation status throughout their flyways*". The strategic plan includes 28 indicators under five objectives[48].	These indicators are primarily process-based, although some of them relate to the CBD focal areas of sustainable use, threats to biodiversity and resource transfer. AEWA also has a range of targets under the overall goal that relate to improving status and trends of migratory waterbird species and populations.
Organisation for Economic Cooperation and Development (OECD)	The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD maintains a database of national environmental indicators as essential tools for tracking environmental progress, supporting policy evaluation and informing the public. These indicators fall into ten categories.[49]	The indicators are endorsed by Environment Ministers and updated reports produced annually based on data provided by Member states' authorities through national reporting, and from other sources. Reports are prepared by the OECD secretariat with support from the OECD Working Group on environmental Information and Outlooks. The OECD does note that that definitions and measurement methods vary among countries, and that inter-country comparisons require careful interpretation.

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46   EEA (2007) Halting the loss of biodiversity by 2010: proposal for a first set of indicators to monitor progress in Europe. EEA Technical Report No 11/2007.

47   CAFF (2008) CBMP Five-Year Implementation Plan.

48   AEWA (2008). Draft Strategic Plan For The Agreement On The Conservation Of African-Eurasian Migratory Waterbirds For The Period 2009-2017. AEWA/MOP 4.19.

49   OECD (2008). Key Environmental Indicators. OECD Environment Directorate, Paris.

Annex II

Areas of overlap between indicators in the Convention on Biological Diversity indicator framework with environment-related indicators in the Commission on Sustainable Development and Millennium Development Goals frameworks

CBD[50]	MDGs[51]	CSD[52]
Trends in extent of selected biomes, ecosystems, and habitats	7.1 Proportion of land area covered by forest	Proportion of land area covered by forests *Area of selected key ecosystems* *Area of coral reef ecosystems and percentage live cover*
Trends in abundance and distribution of selected species		*Abundance of selected key species*
Coverage of protected areas	7.6 Proportion of terrestrial and marine areas protected	Proportion of terrestrial area protected, total and by ecological region Proportion of marine area protected *Management effectiveness of protected areas*
Change in status of threatened species	7.7 Proportion of species threatened with extinction	Change in threat status of species
Trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socioeconomic importance		
Area of forest, agricultural and aquaculture ecosystems under sustainable management		*Area of forest under sustainable forest management*
Proportion of products derived from sustainable sources	7.4 Proportion of fish stocks within safe biological limits	Proportion of fish stocks within safe biological limits
Ecological footprint and related concepts		
Nitrogen deposition		*Fertilizer use efficiency*
Trends in invasive alien species		*Abundance of invasive alien species*
Marine Trophic Index		*Marine trophic index*
Water quality of freshwater ecosystems		
Trophic integrity of other ecosystems		
Connectivity / fragmentation of ecosystems		*Fragmentation of habitats*
Incidence of human-induced ecosystem failure		
Health and well-being of communities who depend directly on local ecosystem goods and services		
Biodiversity for food and medicine		
Status and trends of linguistic diversity and numbers of speakers of indigenous languages		
Other indicator of the status of indigenous and traditional knowledge		
Indicator of access and benefit-sharing		
Official development assistance provided in support of the Convention		

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50   http://www.cbd.int/2010-target/framework/indicators.shtml; indicators not under development in *italics*

51   http://www.un.org/millenniumgoals/

52   http://www.un.org/esa/sustdev/natlinfo/indicators/factsheet.pdf; non-'core' indicators in *italics*

CBD[50]	MDGs[51]	CSD[52]
Indicator of technology transfer		
	7.2 CO$_2$ emissions, total, per capita and per \$1 GDP (PPP), and 7.3 consumption of ozone-depleting substances	Carbon dioxide emissions
		Emissions of greenhouse gases
		Consumption of ozone depleting substances
	7.5 Proportion of total water resources used	Proportion of total water resources used
	7.8 Proportion of population using an improved drinking water source	
	7.9 Proportion of population using an improved sanitation facility	
	7.10 Proportion of urban population living in slums	Proportion of urban population living in slums
		Natural hazards
		Percentage of population living in hazard prone areas
		Human and economic loss due to natural disasters
		Atmosphere
		Ambient concentration of air pollutants in urban areas
		Land
		Land use change
		Land degradation
		Land affected by desertification
		Arable and permanent cropland area
		Use of agricultural pesticides
		Area under organic farming
		Percent of forest trees damaged by defoliation
		Percentage of total population living in coastal areas
		Bathing water quality
		Water use intensity by economic activity
		Presence of faecal coliforms in freshwater
		Biochemical oxygen demand in water bodies
		Wastewater treatment
		Consumption and production patterns
		Material intensity of the economy
		Domestic material consumption
		Annual energy consumption, total and by main user category
		Share of renewable energy sources in total energy use
		Intensity of energy use, total and by economic activity
		Generation of hazardous waste

Annex III

Areas of overlap between the Ramsar Convention indicators of effectiveness and indicators under selected other frameworks[53]

Ramsar indicators of effectiveness	Convention on Biological Diversity 2010 indicators (global)	Streamlining European 2010 Biodiversity Indicators	Millennium Development Goals indicators
A. Overall conservation status of wetlands 1. Status of and trends in ecosystem extent 2. Trends in conservation status of wetlands – qualitative assessment	Trends in extent of selected biomes, ecosystems and habitats	Trends in extent and composition of selected ecosystems in Europe Change in status of habitats of European interest	None
B. Status of the ecological character of Ramsar sites Trends in conservation status of Ramsar sites – qualitative assessment	Ecosystem integrity and ecosystem goods and services: connectivity and fragmentation of ecosystems	Change in status of habitats of European interest Changes in patch size distribution of natural areas Status and trends in the fragmentation of river systems	None
C. Water quality 1. Trends in dissolved nitrate and nitrogen concentration 2. Trends in biological oxygen demand (BOD)	Ecosystem integrity and ecosystem goods and services: water quality of freshwater ecosystems	Nutrients in transitional, coastal and marine ecosystems Water quality in freshwater	None
D. Frequency of threats affecting Ramsar sites Frequency of threats affecting Ramsar sites – qualitative assessment	Trends in nitrogen deposition Trends in invasive alien species	Critical load exceedance for nitrogen Alien and invasive alien species in Europe Impact of climate change on biodiversity: species abundance indicator	None
E. Wetland sites with successfully implemented conservation or wise-use management plans 1. Trends in management effectiveness at Ramsar sites 2. Management effectiveness at Ramsar sites – distribution of scores	Protected area management effectiveness	None	None
F, Overall population trends for wetland taxa Status of and trends in waterbird biogeographic populations	Trends in abundance and distribution of selected species	Trends in abundance and distribution of selected species: European butterflies and common birds	None
G: Changes in threat status for wetland taxa Wetland Red List Index	Change in status of threatened species	IUCN Red List for European Species Change in status of species of European interest	MDG7: Ensure environmental sustainability 7.7 Proportion of species threatened with extinction

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[53]   Adapted from "Further development of indicators of effectiveness of the implementation of the Convention" (Ramsar COP10 Doc.23), available at www.ramsar.org.

Ramsar indicators of effectiveness	Convention on Biological Diversity 2010 indicators (global)	Streamlining European 2010 Biodiversity Indicators	Millennium Development Goals indicators
H: Proportion of candidate Ramsar sites designated to date Coverage of wetland biodiversity resources by designated Ramsar sites	Coverage of protected areas and overlays with biodiversity Status of resource transfers: official development assistance in support of the Convention	Trends in national establishment of protected areas Designated sites under the European Union Habitats and Birds Directives	MDG7: Ensure environmental sustainability 7.6 Proportion of terrestrial and marine areas protected

Annex IV

Progress in developing the Convention on Biological Diversity 2010 biodiversity indicators[54]

The following table graphically depicts the current state of the headline indicators in the Convention on Biological Diversity indicator framework. The smiling face symbol, ☺, denotes indicators that are fully developed on the basis of well-established methodologies and global time-series data. The lower-case o surmounted by a tilde, õ, denotes indicators that are currently being developed. The × symbol denotes indicators that are not currently being developed. Multiple labels indicate multiple measures under each headline.

Components of biodiversity	
Trends in extent of selected biomes, ecosystems and habitats	☺ õ
Trends in abundance and distribution of selected species	☺ õ õ
Coverage of protected areas	☺ õ õ
Change in status of threatened species	☺
Trends in genetic diversity	õ õ
Sustainable use	
Area under sustainable management	õ õ õ
Proportion of products derived from sustainable sources	☺ õ õ
Ecological footprint and related concepts	☺
Threats to biodiversity	
Nitrogen deposition	☺
Trends in invasive alien species	õ
Ecosystem integrity and ecosystem goods and services	
Marine Trophic Index	☺
Water quality of freshwater ecosystems	☺
Trophic integrity of other ecosystems	×
Connectivity and fragmentation of ecosystems	õ õ
Incidence of human-induced ecosystem failure	×
Health and well-being of communities	õ
Biodiversity for food and medicine	õ õ
Knowledge, innovations and practices	
Status and trends of linguistic diversity	õ
Indicator of status of indigenous & traditional knowledge	×
Access and benefit sharing	
Status of access and benefits sharing	×
Resource transfers	
Official Development Assistance provided in support of the Convention	õ
Indicator of technology transfer	×

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54   Table adapted from Walpole and others (see note 13, above.

Annex V

Analysis of ecosystem service indicators included in Millennium Ecosystem Assessment subglobal assessments[55]

It is clear from the findings (Figure 1) that there are more indicators on provisioning services than there are for other ecosystem services and in particular, indicators for regulating, supporting and cultural services are seriously underrepresented in all SGAs and ESPA assessment reports that were reviewed.

Figure 1: The number of indicators used in 20 SGAs and 5 ESPA reports per ecosystem service theme

Service category	Number of indicators	
Cultural		**38**
Aesthetic values		1
Heritage		1
Recreation and ecotourism		32
Spiritual		3
Education		1
Provisioning		**217**
Biochemical's etc		8
Fibres		38
Food		112
Freshwater		41
Fuel		14
Ornamental resources		4
Regulating		**70**
Air quality regulation		4
Climate regulation		15
Erosion regulation		10
Natural hazard regulation		13
Water purification and waste treatment		13
Water quality regulation		13
Water regulation		2
Supporting		**19**
Nutrient cycling		3
Primary production		13
Soil formation		3
Grand Total		**344**

A total of 217 indicators of provisioning services were identified, 70 indicators of regulating services, 38 indicators of cultural services and 19 indicators of supporting services. The dominance of indicators of provisioning services is possibly due in part to the long history of measuring and communicating provisioning services. Provisioning services have a clear and immediate relationship to people. Provisioning services such as timber, crops and livestock production can be indicated by their market prices and other monetary values. Indicators of provisioning services are easily quantifiable. Supporting, regulatory and cultural services, in contrast, belong to indirect services and often cannot be converted directly into monetary values. Indicators that accounted for these three services were few. The following section presents an analysis of indicators of each one of the four ecosystem services categories.

The analysis showed that:

- Ecosystem service indicators are dominated by the provisioning services, only few ecosystem service indicators were available for cultural or supporting service

- Provisioning services are dominated by food service indicators

- Cultural service indicators are dominated by recreation/ecotourism indicators

- Regulating services indicators are more evenly split among several different service types

- Supporting services are dominated by primary production indicators

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55   Results taken from UNEP-WCMC (2009) *Ecosystem service indicators: gaps, opportunities and next steps*. Unpublished workshop background paper, September 2009.

- Indicators comprise a mixture of direct indicators of supply or demand and indirect or indicators of potential service using factors such as ecosystem extent

- Several ecosystem services identified within the MA have not been addressed within SGA reports (pollination, sense of place, genetic resources, pest regulation)

- When the type of indicator is classified as representing service "supply" or "demand"

  o Provisioning service indicators are dominated by those that indicate the supply of a service,

  o Cultural service indicators include many that reflect the demand for a service rather than the overall total supply

Provisioning services indicators

As noted above, the review showed that there are more indicators and data on provisioning services (such as food (crop and livestock) production, dietary energy supply, employment in crop and animal production, capture fisheries, wild foods, timber production and freshwater supply) than they are for other ecosystem services categories. The relatively large number of indicators of provisioning services is not surprising because data for these services such as crop, livestock, timber production and freshwater are readily available and easily quantified.

Provisioning services resonate with policy makers and there is an obvious direct link between these services and human welfare. As a result, most of provisioning services are of great local, national and global importance and data on these are available. In fact, there are national statistics on, for instance, food production (FAO) and timber production (FAO). Well-established organizations such as FAO are routinely collecting these data and acting as a repository for these data.

The SGAs and ESPA assessment reports reviewed used a range of indicators to assess the condition of the provisioning service, measuring different aspects of the service. The food production service theme had more indicators than other ecosystem services themes under provisioning services with the majority of indicators being on crop production followed by capture fisheries, livestock production, wild foods and aquiculture.

Cultural services indicators

Very few indicators to assess the condition of the cultural services were used in the SGAs and ESPA assessments. A total of 37 indicators of cultural services were identified. The majority of indicators under cultural services were on recreation and ecotourism (28 indicators). Examples of indicators of recreation and ecotourism are: *number of visitors to ecotourism farms, number of visitors to national parks and reserves, income from nature based tourism, total employment in the tourism industry, value of recreation fisheries).* This not surprising because ecotourism is one of the easier cultural services to quantify. Indicators of spiritual services (e.g. *the number of people who place high value on the place they were born* and the *number of sites and species that are fundamental to the performance of rituals and maintaining the relation with ancestors*) were also identified. Many cultural services (e.g. spiritual, ethical, aesthetic and heritage services) are not as tangible as provisioning services, nor are they perceived consistently by people. For instance, aesthetic and spiritual services, are difficult to express in quantitative terms, and are experienced differently across cultures and individuals. Assessment of cultural services in the majority of SGAs and ESPA assessments almost always relies on descriptive information rather quantitative data and most of this data is generated through participatory processes.

Other reasons for the shortage of cultural services indicators also include:

- Cultural ecosystem services need to be (re)defined for each specific context - that it is difficult to do so in a specific enough way (values tend to be quite subjective.

- There is the added difficulty of pinpointing the exact nature of the service. For example, think of a supposedly beautiful landscape – it is difficult to tell which elements of that landscape exactly comprise the service.

- Establishing meaningful and specific indicators on cultural services requires links between ecology and the social sciences and is not an easy thing.

In terms of regional distribution of the indicators of indicators of cultural services, Asia and Africa has the most, followed by Europe and Latin America.

Regulating services indicators

The SGA and ESPA assessments reports that were reviewed also used indicators of regulating services. A total of 62 indicators were identified. Examples of indicators of regulating services included air quality regulation (e.g. *ambient air quality, levels of pollutant in the air*), climate regulation services (e.g. *carbon sequestration capacity of sea grass, CO2 storage, carbon stock exchanges*), indicators of erosion regulation services (e.g. *area under shade coffee, areas with exposed soil, landslide frequency*) indicators for water purification and waste treatment services (e.g. *level of reduction of faecal coli and ammonia due wetland filtering, regulatory effect of tidal variation on total coliforom contamination*), natural hazard regulation services (e.g. *area of mangrove extent, economic value of environmental protection role of forests, estimated flood mitigation capacity of wetlands)* and indicators of erosion regulation services (e.g. area under shade coffee, areas with exposed soil, landslide frequency), indicators for water purification and waste treatment.

The small number of regulating services indicators is not surprising because many regulating services are not as tangible and perceived by people. For example, indicators on disease, pest regulation and pollination were not available despite the importance of these services to food production. It is interesting that European SGAs had the most number of indicators of regulating services followed by Asia. This could be due to the availability of reporting initiatives on regulating services in the EU.

Supporting services indicators

The study also showed that the SGAs and ESPA assessments used few supporting services indicators. In fact, supporting services had the least number of indicators as compared to provisioning, cultural; and regulating services. The shortage of supporting, followed by regulating and cultural services indicators beg for particular attention to be focused on these indicator categories. Asian SGAs and ESPA assessments had the most number of indicators of primary production. We hardly found any indicators that accounted for the water cycling indicator service theme.

Data availability

The study also revealed the paucity of agencies that compile data on ecosystem services from multiple countries and publish the data for easy access and use. Comprehensive data availability is clearly important for being able to apply the indicators. Strong databases are also important to continue refining ecosystem services indicators in the future. To develop aggregated indicators or indexes, data from many individual indicators and measures will be necessary as inputs into the aggregate measure.

Most of the data used in the assessment were obtained mainly from the following agencies:

Name of agency
Food and Agriculture Organization of the United Nations (FAO) (e.g. food balance sheets, FAOSTAT),
Intergovernmental Panel on Climate Change (IPCC),
United States Department of Agriculture - Foreign Agricultural Service (USAD –FAS),
The International Tropical Timber Organization (ITTO),
Centre for International Forestry Research (CIFOR),
International Energy Agency (IEA),
the World Resources Institute (WRI),
UN Millennium Indicators
International Network for Bamboo and Rattan (INBAR),
World Tourism Organisation (WTO) and
African Development Bank (AfDB).

Annex VI

Experience with indicators at the regional level: Streamlining European 2010 Biodiversity Indicators

1.   Streamlining European 2010 Biodiversity Indicators (SEBI2010)[56] is a pan-European initiative led by the European Environment Agency (EEA) to facilitate the development and uptake of a common set of biodiversity indicators to track progress towards the target of *halting* the loss of biodiversity by 2010 adopted by both the European Union and pan-European processes. Development of the indicator set involved a wide range of individuals and organizations contributing directly and through working groups, and has so far resulted in a technical report describing the indicators and how they are calculated and used,[57] and a first assessment of progress based on the indicators[58]. SEBI2010 has identified 26 indicators under seven focal areas, and not unsurprisingly there is considerable overlap with the content of CBD indicator framework. Indeed this was deliberately and actively worked towards so as to ensure a degree of coherence.

2.   Some of the key challenges identified in initially developing the set of indicators was in finding indicators which could be calculated for as many pan-European countries as possible, given variation in data availability in particular, in reducing the set of proposed indicators to a manageable number, and in ensuring that the indicators chosen were the ones most helpful for understanding achievement of policy objectives. In addition, as the availability of data from public bodies varies, use was made of data from non-governmental environmental organisations, with the hope that the existence of the set of biodiversity indicators and their recognition in policy documents would motivate countries to improve data collection.

3.   However it is important to recognise that these indicators essentially draw primarily on existing data and indicators, and that this brings inherent bias in terms of what data can be used, and the existing were developed for different purposes by different institutions. A working group was therefore established to explore how interlinkages between indicators could increase their value and address some of the concerns.

4.   In a preliminary report,[59] the working group considered that while the indicator-set has the potential to enable policy makers to evaluate the progress towards the 2010-target it is questionable whether on the currently produced indicators scientifically sound conclusions could be drawn. The working group considered that improvements were required to inform policy makers in a proper manner, and made the following preliminary recommendations in addition to a list of suggested short-term actions.

5.   On the representativeness of the indicators:

        (a)   improve or extend the existing indicators and the databases underlying them to take account of additional species groups and additional genetic resources;

        (b)   seek ways to make more effective use other existing data sources where data are collected in an harmonised way;

        (c)   develop and improve indicators in those areas currently not properly covered, such as those addressing threats, use (goods and services, and sustainable use), ecosystem integrity and responses; and

        (d)   extend monitoring systems to improve coverage and consistency, using harmonised standards and being appropriately quality controlled.

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56   For all SEBI2010 documentation see biodiversity-chm.eea.europa.eu/information/indicator/F1090245995

57   EEA (2007) Halting the loss of biodiversity by 2010: proposal for a first set of indicators to monitor progress in Europe. EEA Technical Report No 11/2007.

58   EEA (2009) Progress towards the European 2010 biodiversity target. EEA Report No 4/2009

59   Interlinkages between SEBI2010-indicators: Improving the information power. Intermediate report to the SEBI2010 Coordination Team, 13 March 2009

6.   On interlinkages between the indicators:

        (a)   build models of the major cause-effect relationship using the DPSIR framework in a concerted scientific manner;

        (b)   make temporal scales, spatial scales, baselines, assessment principles and critical levels more coherent so that indicators have the potential to provide a more coherent picture when taken together;

        (c)   determine critical levels in order to assess whether marine ecosystems, forest and agriculture are sustainably managed; and

        (d)   ensure that those facilitating development of national and regional biodiversity research strategies address these issues.

7.   The preliminary report goes on to say that indicators inform policy makers about the actual change in biodiversity and its use over time and space, and that in combination with models they are an indispensable tool for determining the major causes, their relative contribution, and finding cost-effective measures. Evaluation of the progress to the target is important, but using indicators as a continuous feed back to adjust and fine tune policies is of much higher value. They go on to say that while the cost of implementing their recommendations is high, the societal cost of policy inaction or wrong policies based on invalid information will be much higher.

8.   Other working groups are reviewing communications, and biodiversity and climate change.

Annex VII

Reports to the Convention on Biological Diversity on national-level indicators

1.   National governments recognise the need to develop their own indicator monitoring programmes, both for national biodiversity planning and for reporting against international commitments like the CBD 2010 Target and the MDGs. This is also encouraged by a number of decisions taken by intergovernmental processes. While this review is specific to the CBD, it is illustrative of the broader field of biodiversity and ecosystem service indicator development and use, and therefore relevant to the discussion on an IPBES.

2.   A review of the available 3rd and 4th National Reports to the CBD suggests that national indicators have been adopted using the CBD framework as a guide, but designed to fit the specific national context. There is widespread recognition of the importance of national indicators and reference is made in both 3rd and 4th National Reports to a very wide range of indicators. These span all seven CBD focal areas, although they predominate in three focal areas: status and trends of the components of biodiversity; threats to biodiversity, and; ecosystem integrity and ecosystem goods and services.

3.   Despite much progress, there is a general perception that further development of national capacity to develop, monitor and report against agreed indicators is required in large parts of the world. National focal points for conventions like the CBD are often required to complete indicator-based reports without access to all of the necessary data (or the technical agencies capable of delivering it) to facilitate accurate, up-to-date, scientifically credible and comparable reporting.

4.   A review of indicators in the 4th National Reports to the CBD suggested the following:

(a)   Parties are in different stages as far as the use of national indicators to specifically measure progress towards the 2010 target is concerned. Some indicated that they do not have national indicators; some indicated that indicators are being developed; some mentioned indicators in their report but no further detail or data were provided, some eluded to indicators in the report and presented information showing trends in status of biodiversity and ecosystems. Few Parties reported on the indicators with evidence of use.

(b)   Parties mentioned they have not developed national biodiversity indicators. Reasons for this include a lack of administrative and technical capacity, inadequate funding available to the government, and political instability meaning routinely monitoring indicators was not feasible.

(c)   The majority of Parties listed indicators that were in development. Quantitative indicator data was not often presented as evidence of change. Some Parties used simple (qualitative) scoring to show if there has been progress, no change or negative development with regard to specific global 2010 indicators.

(d)   The majority of developing countries blamed their inability to routinely apply indicators on lack of capacity, lack of consistent trend data, absence of ecological baselines against which change is measured and lack of established monitoring systems. "Marginalisation" of environmental ministries and limited knowledge on the definition of indicators to measure progress towards the 2010 CBD target also hinders progress.

(e)   Although there is often a vast body of national data available on various aspects of biodiversity in a country, many of the data sets are "one-off" studies, often covering only a portion of the country. As a result, it can be a challenge to find ways of integrating different data sets and making them comparable to produce time series statistics.

(f)   A lack of institutional responsibility and accountability for biodiversity survey and monitoring makes it very difficult for some countries to establish and verify biodiversity trends. Data ownership and management were common problems. Many government institutions do not have data management structures in place so that data and information is often 'person-bound' rather than 'institution-bound'.

(g)   Sustaining good biodiversity monitoring systems over time is a major challenge in some cases, particularly after donors exit.

Annex VIII

Strengthening the linkages between biodiversity indicators at the global and national scales: a personal perspective

1. The following is based on experience UNEP-WCMC has gained from leading two indicator-related GEF projects, and one project supported by the UN Development Account. The *Biodiversity Indicators for National Use* involved experience in Ecuador, Kenya, Philippines and Ukraine, and the ongoing *2010 Biodiversity Indicators Partnership* project (which has some national support components) and *Building national capacity for policy-making and reporting on MDG-7 environmental sustainability and the 2010 Biodiversity Target* project have so far involved regional workshops in Cambodia, Costa Rica, Kenya, South Africa, Thailand and Trinidad. . While these views are relevant to the CBD, they are illustrative of the broader field of biodiversity and ecosystem service indicator development and use, and therefore appropriate to the discussion on an IPBES.

2. The CBD Conference of the Parties emphasised that national biodiversity strategies and action plans, as the primary mechanisms for the implementation of the Convention and its Strategic Plan, should be developed and/or reviewed with due regard to the relevant aspects of the four goals of the Strategic Plan, and the goals established by decision VII/30. The COP also invited Parties and Governments to use existing national indicators or to establish national indicators, as well as emphasising the need for capacity-building.

3. Having said that, experience from the 2010 BIP workshops on national biodiversity indicators suggests that most of these countries are not developing indicators within the CBD 2010 target indicator framework *per se*, although some have carried out one-off exercises to compile relevant information for the purpose of the CBD 4th National Report.

4. The linkages between global and national biodiversity indicator production and use would appear to currently be weak, and there is even a risk of actions for global biodiversity indicator reporting being a distraction from national biodiversity conservation actions. One of the reasons for the few linkages of data and reporting between global and national biodiversity indicators is that they are mostly produced for different users and differed purposes.

   (a)   *Global scale:* The motivations for global-scale indicators are usually: for reporting on progress in achieving global targets; as a communication tool by interest groups to raise awareness of particular topics; and to support global-scale strategic planning and prioritisation.

   (b)   *National scale:* The aims of national-scale indicator development commonly include: to aid the design and monitoring of conservation strategies; to assist the development of policies and management plans for commercially important biodiversity; and to raise awareness and actions for topics of importance to interest groups, including NGOs and academia.

5. For an indicator to be produced on a consistent basis over time it is necessary for there to be an agency with this responsibility. This agency also has to have the capacity to obtain and analyse the data and communicate the results. One of the reasons for the very limited development of national biodiversity indicators in developing countries is that there is rarely an institution with a clear role and capacity for the consistent production of biodiversity indicators. And while there is usually some relevant data for the production of indicators, this is often not systematically gathered and used as indicators to support decision-making.

6. The principal need for biodiversity information at the national scale is to support the design and implementation of NBSAPs and biodiversity-relevant decision-making by all sectors of society. Very few developing countries have information management systems suitable for the inclusion of biodiversity and ecosystem service considerations in the design of their country's development plans. Currently issues such as land use change for biofuel production or intensifying food production, or programmes for reducing emissions from deforestation and forest degradation are those that will require detailed information on the biodiversity values of major land areas, and changes in those values over time. These information needs may or may not coincide with those of international indicators and reporting requirements, but they will inevitably be the priority at the national level.

7.   Based on these observations, it is suggested that the following two points need to be considered closely when developing successful biodiversity indicators to support management actions:

(a)   Indicators must be seen as part of a process of understanding and managing biodiversity and the natural environment. They are not the start or the end points for analysis and decision‑making, but information tools to help identify and understand important issues and to monitor progress.

(b)   Indicators for reporting and management decision‑making should be designed in relation to a description of the desired state or behaviour of a process or issue. Ideally the definition of desired states and behaviours of an issue should be informed by conceptual models including both biophysical and socio‑elements and their relationships. Conceptual models and indicators of their variables also form the basis of models for scenario analysis, to explore possible consequences of policy options.

8.   While global biodiversity indicators are undoubtedly important, in order to best support national efforts, further development of the indicator frameworks for MEAs and other international processes with national implications should probably focus on strengthening the information for actions to implement those agreements and processes at the national level, with global scale reporting and analysis a vital but secondary objective. This will help ensure that not only are national needs directly supported, but that there is therefore a clear "interest" in maintaining the relevant data into the future.

Annex IX

International expert workshop on the 2010 biodiversity indicators and post-2010 indicator development: workshop summary

A workshop convened by the UNEP World Conservation Monitoring Centre (UNEP-WCMC)

In cooperation with the Secretariat of the Convention on Biological Diversity (SCBD)

Hosted by the UK Department for Environment, Food and Rural Affairs (Defra), with funding provided by the European Commission (EC), the UK Joint Nature Conservation Committee (JNCC), and the United Nations Environment Programme (UNEP)

Innovation Centre, Reading, United Kingdom of Great Britain and Northern Ireland

6-8 July 2009

INTRODUCTION

1.   In 2010, Parties to the Convention on Biological Diversity (CBD) will review the extent to which progress has been made in meeting the global biodiversity target, and to develop a new, post-2010 strategic plan and associated target(s). Progress towards the 2010 target is being tracked using a framework of indicators, and the extent to which policy-makers and society will be able to assess their achievements, and identify suitable responses, is largely dependent upon the information provided by such indicators.

2.   In July 2009, the Secretariat of the Convention on Biological Diversity (SCBD) and the UNEP World Conservation Monitoring Centre jointly convened a meeting to review the use and effectiveness of the 2010 biodiversity indicators and to consider the implications for the development of post-2010 targets and indicators. The meeting was hosted by the UK Department for Environment, Food and Rural Affairs (Defra), whilst additional financial support was provided by the United Nations Environment Programme (UNEP), the European Commission (EC) and the UK Joint Nature Conservation Committee (JNCC). The workshop brought together over 70 participants including government-nominated experts and representatives of biodiversity-related conventions, UN agencies, academic and research institutions and other relevant international, inter-governmental and non-governmental organizations. This is a summary of that meeting.

KEY LESSONS FROM THE 2010 BIODIVERSITY INDICATORS PROCESSES

3.   The following are the summarised key lessons identified at the workshop after working group discussions on the first day. They fall roughly into three categories: lessons regarding the framework, lessons regarding the indicators themselves, and lessons regarding communication.

A.   Framework logic and content

(a)   The flexibility of the framework, which enables its implementation at a variety of scales, has facilitated its political adoption, which, in turn, has boosted support for developing the detail of the indicators under the framework.

(b)   The framework is comprehensive, and can be mapped to other frameworks (such as DPSIR), but there have been problems showing how it fits together to integrate the indicators into a coherent story.

(c)   The framework is primarily structured around CBD priorities, but its relevance to other sectors / MEA processes is less clear, thereby hindering its uptake and use, beyond the CBD.

(d)   The parallel development of the CBD targets and goals, and the indicator framework, has led to a disconnect which was not intended.

(e)   The complexity of biodiversity, and of the framework, is a continuing problem in terms of communicating to disparate audiences.

(f)   The current indicator set is incomplete in a number of areas; e.g., wild genetic resources, ecosystem quality, ecosystem services, sustainable use, human well-being, ABS and indigenous local knowledge, and both threats and responses more broadly.

B.   Indicator development

(a)   There is a tension between scientific rigour and communicating the results of the indicators to a variety of audiences. Both are needed.

(b)   Some indicators are well developed, but others are still under-developed.

(c)   The representativeness and adequacy of the data underlying the indicators needs to be transparently documented, and their geographic / taxonomic / temporal coverage needs to be improved.

(d)   Methods for assessing the significance of change, and distance to target are underdeveloped.

(e)   There is no clear process or criteria for evaluating the scientific rigour of the indicators.

C.   Communication

(a)   Focussing on outcomes has concentrated minds and spurred engagement, but the absence of clear targets and awareness raising is a barrier to arousing public interest.

(b)   The communication that has taken place has been *ad hoc*, opportunistic, and more focussed on reporting than a systematic effort to convey the lessons from the indicators; there is an especial challenge of communicating 'bad news'.

(c)   Biodiversity means different things to different sectors – the messages from individual indicators, and the set as a whole, do not take this fully into account.

CONCLUSIONS AND RECOMMENDATIONS FOR POST-2010 INDICATORS

4.   The choice of indicators for the post-2010 period will depend on the target(s) adopted by the CBD. However these targets must be measurable, which in turn depends on our scientific capability to develop and deliver the appropriate indicators to track progress. Thus, the development of targets and indicators must be undertaken in tandem through an iterative process.

A.   Principal recommendations for the post-2010 indicators

5.   The workshop crafted a series of recommendations of which the following were voted the most important:

(a)   A small set of (10-15) broad headline indicators, clearly linked to the main target and sub-targets and underscored by more specific sub-indicators/measures, should be maintained/developed, in order to communicate the indicator set through key storylines and clear, policy relevant messages, while maintaining a flexible framework to cater for national/regional needs.

(b)   The current framework of global indicators should be modified and simplified into four 'focal areas': Threats to Biodiversity; State of Biodiversity; Ecosystem services, and; Policy responses. Existing indicators should be re-aligned with the new framework, as appropriate, in order to maintain continuity and enhance their use. The relationships between the focal areas and between indicators and targets should be clearly explained and documented, including their scientific basis and assumptions.

(c)   Some additional measures on threats to biodiversity, status of diversity, ecosystem extent and condition, ecosystem services and policy responses should be developed in order to provide a

more complete and flexible set of indicators to monitor progress towards a post-2010 target and to clearly link actions and biodiversity outcomes to benefits for people.

(d)   National capacity for framework application, indicator development, data collection and information management should be further developed and properly resourced in order to strengthen countries' ability to develop, monitor and communicate indicators in a participatory, sustained and integrated way; and to link with other processes e.g., MEAs at all levels.

(e)   Priority must be given to developing a communication strategy for the post-2010 targets and indicators in order to inform policy discussions and ensure effective communication of messages coming from the indicators into all sectors (including inter alia delivering stories relevant to human well-being, identifying champions, promoting a regular reporting process, etc).

(f)   A flexible and inclusive process/partnership for post-2010 indicator development should be maintained and adequately resourced in order to increase collaboration in the development, quality control, implementation and communication of indicators at all levels, including the sharing of experience and the building of capacity.

B.   Additional recommendations and action points

6.   The following additional recommendations were made in relation to the target, the framework, the indicators and the process:

(a)   The post-2010 target should take account of biodiversity, ecosystem services and human well-being, recognising the linkages between them, in order to communicate effectively and improve understanding of their interdependence.

(b)   The target timeframe should incorporate a long enough period required to improve the state of biodiversity as well as interim milestones that satisfy the more rapid reporting required for policy relevance.

(c)   The target should be formulated in terms of a level or change rather than rate of change (e.g., maintain and restore levels rather than reduce the rate of loss), in order to facilitate reporting and communication of all indicators.

(d)   Target-setting should take into account, but not be constrained by, data availability, baselines and scales, in order to allow the development of meaningful indicators.

(e)   The process of indicator development should follow best available scientific practices that would allow the development of a clear and credible set of indicators, and that each indicator has a clearly documented, peer-reviewed, published methodology; with access to underlying data; data quality control; subject to initial testing and periodic independent review of results, in order to obtain meaningful, scientifically sound indicator results.

(f)   Among existing indicators, those where there is little prospect of collecting data and their continuing importance/relevance is low should be dropped, in order to focus the use of limited financial and human resources.

(g)   Synergies in indicator use across MEAs should be sought, using the best available and established information methods, networks and data sets, in order to streamline reporting processes thereby increasing efficiency and cost effectiveness.

(h)   A high priority should be given to expanding the taxonomic, biome and geographic coverage of existing indicators (especially biodiversity status indicators), e.g., through increased funding of in-field data collection (and capacity building) especially in biodiversity rich regions, through a coordinated global biodiversity monitoring strategy, in order to provide a more robust, reliable and representative assessment of the status of biodiversity, threats to it, and actions being taken.

(i)   Indicators within the 'Threats to biodiversity' focal area should be expanded to include additional direct and indirect drivers (or threats) as they apply or relate to biodiversity, ecosystem services and human well being, taking advantage where possible of already collected data (e.g., World Bank, climate change etc). Such threat indicators should be closely linked to appropriate biodiversity measures so that it can be clear to policy makers how actions to reduce threats affect biodiversity change.

(j)   Individual indicators should be capable of disaggregation, for example into functional groups, taxonomic groups, biome and geographic areas, in order to allow the identification of trends and priorities for action at meaningful scales.

(k)   A wide ranging, but cost-effective process for review, (including independent inputs) of the indicator suite, at appropriate intervals (taking account of the need for stability as far as possible) should be adopted at the outset, to allow adaptation to new needs and lessons learned from experience, in order to keep the indicators fit for purpose.

NEXT STEPS

7.   The full report of the workshop considerations and conclusions will be made available in early September (see www.cbd.int/doc/?meeting=EMIND-02), and will be submitted to the Secretariat of the CBD for inclusion as an information document at SBSTTA 14, and as a contribution to other events in the process of developing a post-2010 CBD strategic plan. Its findings will also be distributed more widely for use by other MEAs, by related initiatives, and by regional and national indicator processes.

8.   The workshop is expected to stimulate additional follow-on activities, including further development and elaboration of proposed indicator frameworks. As far as possible these will be tracked by the 2010 BIP Secretariat at UNEP-WCMC and reported through the 2010 BIP website (www.twentyten.net).

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