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**SUBSIDIARY BODY ON SCIENTIFIC, TECHNICAL  
AND TECHNOLOGICAL ADVICE**

Twelfth meeting

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Item 4.1 of the provisional agenda\*

**IMPLICATIONS OF THE FINDINGS OF THE MILLENNIUM ECOSYSTEM ASSESSMENT  
ON THE WORK OF THE CONVENTION***Note by the Executive Secretary***EXECUTIVE SUMMARY**

At its eighth meeting, the Conference of the Parties to the Convention on Biological Diversity considered the implications of the Millennium Ecosystem Assessment (MA) for the work of the Convention and provided guidance on the application of the conceptual framework and methodologies of the Millennium Ecosystem Assessment for planning processes and future assessments. In addition, the Conference of the Parties decided to consider and engage in evaluations of the Millennium Ecosystem Assessment with a view to identifying options for improving the availability to SBSTTA of scientific information and advice on biodiversity (decision VIII/9).

The present note reports on early progress made in implementing decision VIII/9. It presents evidence that the conceptual framework and methodologies of the Millennium Ecosystem Assessment are being applied in national ecosystem/biodiversity assessments and that it is expected to continue affecting planning processes by influencing impact assessment processes and promoting application of the ecosystem approach.

The note summarizes three evaluations of the Millennium Ecosystem Assessment: a survey of initial impacts prepared by the Millennium Ecosystem Assessment Secretariat on the basis of survey of individuals involved in the Assessment; the Terminal Evaluation of the United Nations Environment Programme/Global Environment Facility (UNEP/GEF) project prepared by the UNEP Evaluation and Oversight Unit; and the report of the Environmental Audit Committee of the United Kingdom House of Commons. The evaluations suggest a need to conduct, facilitate and support assessments at scales relevant for decision-making, in particular national and/or subregional assessments. Such assessments should make use of the experience made with the subglobal assessments of the Millennium Ecosystem Assessment and, in their design, take into account the conclusions drawn from the Assessment experience. The conceptual framework of the Millennium Ecosystem Assessment has been recognized

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\* UNEP/CBD/SBSTTA/12/1.

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as being particularly useful as an analytical basis for such assessments. Along with the principles of the ecosystem approach the conceptual framework should be considered in the review, revision and implementation of national biodiversity strategy and action plans. Further feedback from countries on the impact of the Millennium Ecosystem Assessment would be useful to inform any decision on a future global assessment along the same lines.

When planning such assessments, one should take into account the need to engage stakeholders and decision makers, the value of assessing the economic implications of sustainable ecosystem management and the need for dedicated efforts to communicate the process and findings of the assessment. To facilitate the future access to data generated or identified through such assessments, it is important to consider the effective integration of data and information through adherence to interoperability standards. This would also enable drawing on the data and information from national and sub-regional assessments for larger-scale analyses, such as a future global ecosystem assessment.

Scientific information and observational data from national and sub-regional assessments could help to improve the ability of SBSTTA to provide advice on biodiversity, particularly if a coherent biodiversity-information management system could be established. This will require, *inter alia*, mechanisms to make biodiversity data available to the public, wider collaborative implementation of modern information exchange mechanisms through common methods, protocols, formats and standards, a coherent system for biodiversity-information management, and assessments based on interpretation of a broad range of data sets from various fields that are easily accessible.

## SUGGESTED RECOMMENDATIONS

1. The Subsidiary Body on Scientific, Technical and Technological Advice may wish to recommend that the Conference of the Parties:

(a) *Urges* Parties and *invites* other Governments and relevant organizations to promote and support, through various mechanisms, integrated national, regional and sub-regional ecosystem assessments including, where appropriate, response scenarios that build on the framework and experiences of the Millennium Ecosystem Assessment;

(b) *Invites* Parties and other Governments to make full use of the framework, experiences and findings of the Millennium Ecosystem Assessment when they review, revise and implement their national biodiversity strategy and action plans, relevant development plans, and development cooperation strategies, as appropriate;

(c) *Invites* Parties, other Governments, relevant organizations, stakeholders and indigenous and local communities to consider, when designing integrated local, national or sub-regional assessments, to take into account:

- (i) The need to engage stakeholders, including local and national decision makers in the assessment;
- (ii) The need to integrate the assessment of biodiversity and ecosystem services, including non-market benefits gained from sustainable ecosystem management;
- (iii) The particular value of assessments such as the Millennium Ecosystem Assessment for capacity development among participants and stakeholders;
- (iv) The need for dedicated efforts to communicating the process and findings of the assessment;
- (v) The need to provide, whenever possible, free and open access to all past, present and future publicly funded research results, assessments, maps and databases on biodiversity;
- (vi) The value of supporting the establishment of coherent standards for the collection and integration of biodiversity data and information with a view to their accessibility for future assessments and analyses.

2. The Subsidiary Body on Scientific, Technical and Technological Advice may wish to request the Executive Secretary to:

(a) *Make full use of* the framework, experiences and findings of the Millennium Ecosystem Assessment in carrying out in-depth reviews of programmes of work under the Convention in accordance with the guidelines for review of programmes of work under the Convention contained in annex III to decision VIII/15;

(b) *Contribute* to the preparation and, as appropriate, implementation of a coherent multi-agency strategy for follow-up to the Millennium Ecosystem Assessment, including:

- (i) Support for national and subglobal applications of the conceptual framework of the Millennium Ecosystem Assessment; and
- (ii) Consideration of the need for, and timing of, another global assessment, taking into account the experiences from evaluations of the Millennium Ecosystem Assessment, as well as experiences emerging from the consultative process

towards an international mechanism of scientific expertise on biological diversity and other relevant processes;

(c) *Carry out*, through the clearing-house mechanism of the Convention and in collaboration with relevant partners, an inventory of existing interoperability mechanisms and their respective prospects for facilitating and promoting the exchange of data and information in support of the 2010 target as well as options for wider collaborative implementation of modern information exchange mechanisms through common methods, protocols, formats and standards;

(d) *Participate in and promote* relevant processes towards coherent and inclusive biodiversity observation systems with regard to data architecture, scales and standards, observatory network planning and strategic planning for implementation.

## I. INTRODUCTION

1. The Millennium Ecosystem Assessment (MA) was carried out between 2002 and 2005 to assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contributions to human well-being. The Conference of the Parties (COP), at its eighth meeting, acknowledged the Assessment reports, in particular the synthesis report on biodiversity and its summary for decision makers, and recognized that these reports include key findings relevant to the implementation of the programmes of work under the Convention (decision VIII/9, paragraph 1).
2. In paragraph 17 of decision VIII/9, the Conference of the Parties requested the Executive Secretary to bring the findings of the Millennium Ecosystem Assessment to the attention of the liaison group of the biodiversity-related conventions, and to other multilateral environmental agreements and relevant international and regional processes, with a view to explore options, within their respective mandates and, as appropriate, for joint activities to successfully address and respond to the direct and indirect drivers of biodiversity loss.
3. In paragraph 20 of decision VIII/9, the Conference of the Parties requested the Executive Secretary, in collaboration with relevant organizations, taking into account the scenarios presented in the Millennium Ecosystem Assessment, to assist Parties in the development of appropriate regionally-based response scenarios within the framework of the Convention's programmes of work, and to coordinate these efforts with other international and regional organizations involved with work on scenarios.
4. In paragraph 21 of the same decision, the Conference of the Parties requested the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) to take note in its deliberations of the linkages between biodiversity and relevant socio-economic issues and analysis, including economic drivers of biodiversity change, valuation of biodiversity and its components, and of the ecosystem services provided, as well as the role of biodiversity in poverty alleviation and the achievement of the Millennium Development Goals.
5. In paragraph 22 of decision VIII/9, the Conference of the Parties requested SBSTTA and invited Parties to draw upon the lessons learned from the Millennium Ecosystem Assessment process, including the subglobal assessments, and to make use as appropriate of its conceptual framework and methodologies in further developing work on environmental impact assessment, strategic environmental assessment and the ecosystem approach.
6. In paragraph 23 of decision VIII/9, the Conference of the Parties encouraged Parties and other Governments to conduct national and other sub-global assessments making use of the conceptual framework and methodologies of the Millennium Ecosystem Assessment, as appropriate.
7. In paragraph 29 of decision VIII/9, the Conference of the Parties decided to consider, at its ninth meeting, the evaluation of the Millennium Ecosystem Assessment to be undertaken during 2007, and the need for another integrated assessment of biodiversity and ecosystems, taking into account the future plans of the Global Biodiversity Outlook, as well as the outcomes of the current and future processes of the Global Environment Outlook of the United Nations Environment Programme, and scientific assessments that may be undertaken by SBSTTA.
8. In paragraph 30 of the same decision, the Conference of the Parties decided to consider, at its ninth meeting, taking into account the results of other relevant processes, options for improving the availability to SBSTTA of scientific information and advice on biodiversity, keeping in mind the need to avoid duplication of efforts.

9. The Executive Secretary has prepared the current note to report on progress in implementing decision VIII/9 (section II below), and, drawing in particular on the conclusions from three evaluations of the Millennium Ecosystem Assessment of particular relevance for the Convention (section III below), to facilitate the consideration of the need for another integrated assessment of biodiversity and ecosystems (section IV below). Section V discusses options for improving the availability to SBSTTA of scientific information and advice on biodiversity.

10. An earlier draft of this note was posted for review from 26 February 2007 to 13 March 2007 in accordance with notification 2007-026 and review comments were incorporated as appropriate.

## II. PROGRESS IN IMPLEMENTING DECISION VIII/9

11. A number of the provisions of decision VIII/9 are long-term in nature. It is still too early to report comprehensively on progress made in implementing this decision. The following paragraphs present examples of activities undertaken in response to decision VIII/9.

12. In accordance with paragraph 17 of decision VIII/9, the Executive Secretary included the follow-up to the Millennium Ecosystem Assessment on the agenda of the fifth meeting of the Liaison Group of the Biodiversity-related Conventions, held in Gland, Switzerland, on 14 September 2006. The Group discussed joint activities to address drivers of change in the context of the theme for International Biodiversity Day 2007 (“Climate Change and Biodiversity”) and with a view to making collaborative efforts towards the achievement of the 2010 biodiversity target. <sup>1/</sup>

13. Following the request in paragraph 20 of decision VIII/9, to assist Parties in the development of appropriate regionally-based response scenarios, the Executive Secretary initiated, through notification 2006-070, a review of the response scenarios prepared by the Global Methodology for Mapping Human Impacts on the Biosphere (GLOBIO) Consortium for the second edition of the Global Biodiversity Outlook, seeking, *inter alia*, views on relevant subregional and regional response options that should be calculated and relevant data sources and institutions that should be involved in calculating such scenarios. Views received from Parties confirm the need and make suggestions for regionally based scenarios.

14. The Executive Secretary also brought the request to the attention of the GLOBIO3 Directors meeting, held in Cambridge, United Kingdom, on 26-27 June 2006. The partners in the GLOBIO Consortium are currently working with a number of developing country partners on the regional implementation of biodiversity models and scenarios. The focus is initially on capacity-building workshops. The Secretariat is in the process of identifying activities that would strengthen ongoing work on regionally based scenarios.

15. With regard to paragraph 22 of decision VIII/9, the voluntary guidelines on biodiversity-inclusive environmental impact assessment and strategic environmental assessment endorsed through decision VIII/28 make extensive use of the conceptual framework of the Millennium Ecosystem Assessment, with screening criteria focusing on drivers of change, ecosystem services and key processes. The guidelines are being disseminated and used in capacity-building activities, including the series of regional training workshops on national biodiversity strategy and action plans facilitated by the Secretariat. The Convention Secretariat, in collaboration with other partners, also continues to facilitate the integration of relevant elements of the voluntary guidelines on biodiversity-inclusive impact assessment into policies and procedures where these are due for revision. The Millennium Ecosystem Assessment thereby presents an opportunity for enhanced application of the ecosystem approach in

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<sup>1/</sup> See report of the fifth meeting of the Biodiversity Liaison Group at <http://www.biodiv.org/cooperation/BLG-5-rep-final-en.doc>

planning processes and development cooperation policies, as concluded in the note by the Executive Secretary on the review of the application of the ecosystem approach (UNEP/CBD/SBSTTA/12/2).

16. In accordance with paragraph 23 of decision VIII/9, a number of national and subglobal Millennium Ecosystem Assessment-type assessments are being carried out or planned, including several such subglobal assessments which are still continuing. Mexico, for example, is now carrying out its second biodiversity country study ("*Capital natural y bienestar social*") using the Millennium Ecosystem Assessment framework, and this will provide the baseline for its revised national biodiversity strategy and action plan. <sup>2/</sup> Information available to the Secretariat from other countries is probably not up to date since for most Parties preparation of third national reports likely predates follow-up to decision VIII/9.

### III. EVALUATIONS OF THE MILLENNIUM ECOSYSTEM ASSESSMENT

17. The organizations represented on the board of the Millennium Ecosystem Assessment have not yet made a decision regarding an evaluation of the Assessment as referred to in paragraph 29 of decision VIII/9. However, at least three different evaluations of the Millennium Ecosystem Assessment and its impacts have been carried out: an internal survey of initial impacts prepared by the Assessment Secretariat on the basis of survey of individuals involved in the Assessment process released in March 2006; an independent evaluation dated September 2006 of the five-year US\$ 25 million Millennium Ecosystem Assessment project commissioned by the United Nations Environment Programme (UNEP) as the Implementing Agency of the Global Environment Facility (GEF); and the report of the Environmental Audit Committee of the United Kingdom House of Commons published in January 2007. Key findings of these evaluations are summarized in the following paragraphs to facilitate consideration of the need for future integrated assessments of biodiversity and ecosystems.

#### A. *Survey of initial impacts of the Millennium Ecosystem Assessment carried out by the Assessment Secretariat*

18. The survey assessed the initial impact of the Millennium Ecosystem Assessment approach and findings on conventions, regional, national and sub-national Governments, business, donors, non-governmental organizations, international agencies, capacity-building, education, scientific research, and other indications of interest such as sales of documents and website visits. <sup>3/</sup>

19. The following findings are particularly noteworthy for the design of future assessments within or related to the Convention:

(a) Among Governments, the impact of the Millennium Ecosystem Assessment appears to be greatest in regions and countries where sub global assessments were conducted. At the national level, there is little evidence of impact among several other economically and politically influential countries;

(b) The findings of the Assessment were well received by business journalists but the impact to date in the business sector has been relatively limited;

(c) The Assessment has had a notable impact on multilateral and bilateral donors;

(d) The Assessment has had a notable impact on international conservation-oriented non-governmental organizations but much less impact on national non-governmental organizations and no evident impact on non-governmental organizations focused on development, poverty reduction, or health issues;

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<sup>2/</sup> Submission by Mexico in response to notification 2007-004.

<sup>3/</sup> Walter Reid, "Millennium Ecosystem Assessment: Survey of Initial Impacts", Millennium Ecosystem Assessment, March 2006, [www.millenniumassessment.org](http://www.millenniumassessment.org)

- (e) All of the United Nations agencies involved in the Assessment process have incorporated the Assessment's findings and process into their activities;
- (f) The inclusion of a capacity-building component in the Assessment has been useful;
- (g) Materials from the Assessment are being used extensively at tertiary education level but rarely below;
- (h) The Assessment has had a notable impact on research directions and priorities.

20. The survey suggests that a thorough analysis of the impacts of the MA could only be done after sufficient time has elapsed from the release of all the products.

***B. Independent evaluation of the UNEP/GEF project commissioned by UNEP***

21. An independent evaluation of the five-year \$25 million Millennium Ecosystem Assessment project was commissioned by UNEP and published by the UNEP Evaluation and Oversight Unit in September 2006. <sup>4/</sup> Like the report by the Assessment Secretariat on initial impacts prepared six months earlier, the evaluation judged that it was too early to assess the impact of the report.

22. The evaluation considered it a major success that the Millennium Ecosystem Assessment was able to engage the global scientific community, as well as private sector and civil society organizations, and attributes this to the decision not to carry out the assessment through an official intergovernmental process. It specifically noted the high-quality preliminary work and the design of the Assessment framework as factors for the successful engagement of the global scientific community and consequently the authoritative and credible nature of the findings.

23. The evaluation noted the high level of interest in carrying out subglobal assessments (SGAs), which far exceeded expectations and were not matched by the limited budget allocated for SGAs. It concluded that SGAs were particularly successful where they managed to engage with local or national decision makers. Although the SGAs had little influence on the global assessment, varied in technical quality and degree of adherence to the criteria set out for their preparation, some SGAs have produced, or are producing, useful and important outputs and have contributed significantly to capacity development. The evaluation recognizes the potential contribution of the approaches adopted in selected SGAs for the development of a methodology or tool kit for conducting integrated ecosystem assessments at the local, national and global scales.

24. The evaluation on the other hand identified a notable lack of awareness or engagement by political actors in both developed and developing countries. This has been linked to the limited participation of government stakeholders in the implementation and oversight of the Millennium Ecosystem Assessment. It noted an uncertainty over what should happen following the completion of the Millennium Ecosystem Assessment and recommended the development and assessment of options for repeating the Assessment in some form in several years time, ranging from a full-scale repeat to a briefer, less expensive exercise focusing on particular topics.

25. The evaluation further observed that the lack of adequate financial resources limited the communication and outreach efforts that might have been necessary to engage more effectively with decision and policy makers.

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<sup>4/</sup> Terminal Evaluation of the UNEP/GEF Project "Millennium Ecosystem Assessment" - Project Number MT/FP/CP/1010-01-04, September 2006. Accessible at <http://www.unep.org/eou/Pdfs/Millennium%20Eco%20Assessment%20Report%20unedited.pdf>

**C. *Report of the Environmental Audit Committee of the House of Commons of the United Kingdom on the Millennium Ecosystem Assessment***

26. The Environmental Audit Committee of the House of Commons of the United Kingdom of Great Britain and Northern Ireland considers to what extent the policies and programmes of government departments and non-departmental public bodies contribute to environmental protection and sustainable development. In its first report of session 2006-07, the Committee considered the impact of the Millennium Ecosystem Assessment on the Government of the United Kingdom. <sup>5/</sup>

27. In addition to a number of observations and detailed recommendations specific to domestic policies and decision-making processes, the Committee:

(a) Recommended the establishment of a Millennium Ecosystem Fund that would allow developing countries to incorporate the environment into their development strategies;

(b) Supported the establishment of an ongoing international Millennium Ecosystem Assessment programme;

(c) Highlighted the need for communication of findings to be properly resourced in future assessments;

(d) Called for identification and promotion of effective response options, as well as policy proposals directly relevant to decision-makers

(e) Called for a new international, interdisciplinary research strategy, hosted, for example, by the International Council for Science (ICSU), to help coordinate research at a number of scales;

(f) Called for economic indicators that measure growth in a way that recognizes environmental sustainability and more accurately describe human well-being;

(g) Called for the Millennium Ecosystem Assessment findings to become integral to the way in which the Government thinks and works;

(h) Highlighted the need for the findings of the Millennium Ecosystem Assessment to be addressed by stakeholders in all sectors including finance, planning and development cooperation;

(i) Called for national Millennium Ecosystem Assessment-type assessments to be carried out, including a full such assessment for the United Kingdom, to enable the identification and development of effective policy responses to ecosystem service degradation; and

(j) Highlighted the importance of current research on economic valuation of ecosystem services and called for adequate funding to be allocated to the development of tools that would enable decision-makers to appreciate and take advantage of the substantial non-market benefits gained from sustainable ecosystem management.

**IV. CONSIDERATION OF THE NEED FOR FUTURE INTEGRATED ECOSYSTEM ASSESSMENTS**

28. The Millennium Ecosystem Assessment is the most comprehensive assessment of ecosystems carried out to date. Data and information reviewed through the Millennium Ecosystem Assessment and their analysis applying the Assessment framework have already influenced other processes and will contribute to the provision of baseline information for future assessments, including assessments of status

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<sup>5/</sup> House of Commons, Environmental Audit Committee. The UN Millennium Ecosystem Assessment. First Report of Session 2006–07, published on 3 January 2007. Accessible at <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmenvaud/77/77.pdf>

and trends in biodiversity and threats to biodiversity carried out as part of the in-depth reviews of thematic programmes of work, in accordance with the guidelines contained in annex III to decision VIII/15.

29. The evaluations reviewed above recognize the particular value of national and subglobal assessments along the lines of the Millennium Ecosystem Assessment, particularly where they fully engage with local or national decision makers. The Millennium Ecosystem Assessment Toolkit provides selected examples of the application of the Assessment framework for understanding and valuing ecosystem services at a range of scales. <sup>6/</sup> At the same time, the evaluations also identified the difficulties in making links across scales. Future efforts may therefore need to be directed to facilitating the integration of data and information at different scales so as to assist future assessments in drawing on data and information from local sources and incorporating these into global assessments (upscaling).

30. In addition to integrated national and sub-regional assessments and partial, thematic updates of data and information in specific areas through processes such as the Global Biodiversity Outlook and the Global Environment Outlook, there maybe a need for global Millennium Ecosystem Assessment-type assessments at regular intervals, perhaps every decade. These future integrated global assessments would provide a comprehensive picture of the processes driving changes to biodiversity, describe the current status and trends of biodiversity and analyse the ecosystem services sustaining human livelihoods. The design of any future global assessment could usefully be informed by the experience gained, and the findings of, national and other subglobal assessments undertaken in the meantime, and if barriers to upscaling mechanisms could be overcome such global assessments would increasingly draw on data and information generated through national and sub-regional assessments.

31. Differences in views about environmental governance are apparent from the discussions about the need for an International Mechanism of Scientific Expertise on Biodiversity (IMoSEB), which is being considered through, *inter alia*, international conferences and a series of regional consultations. The consultations may provide useful inputs into the discussions on a follow-up to the Millennium Ecosystem Assessment.

32. Less contentious than the desirability and form of a scientific support mechanism for biodiversity is the format for future scientific assessments. On the basis of five major global assessments including the MA a case study conducted in the framework of the consultative process on an IMoSEB suggests that for a scientific assessment to be most useful it has to have certain characteristics: <sup>7/</sup>

- (a) It should be demand-driven, and involve experts and all relevant stakeholder groups in the scoping, preparation, peer-review, and outreach/communication;
- (b) The process must be open, transparent, representative, and legitimate, with well defined principles and procedures;
- (c) The process, when appropriate, should incorporate formal scientific as well as local and indigenous knowledge, which is often informal – essential for an issue such as biodiversity;
- (d) The findings and analyses need to be technically accurate and evidence-based, not value-laden;
- (e) The assessment should be policy-relevant but not policy-prescriptive, i.e. provide options rather than recommendations;

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<sup>6/</sup> Millennium Ecosystem Assessment. A Toolkit for Understanding and Action. Protecting Nature's Services. Protecting Ourselves. Island Press, 2007. Accessible at: <http://www.islandpress.org/MAToolkit>

<sup>7/</sup> Watson, R.T. & Gitay, H., 2007: Science-policy interface: The role of scientific assessments. Case-study conducted in the framework of the consultative process towards an IMoSEB. January 2007, 21 pp. Accessible at: <http://www.imoseb.net/forums/public/viewtopic.php?p=106#106>

- (f) The assessment should cover risk assessment and risk management; and
- (g) It should present different points of view that often exist, and whenever possible quantify the uncertainties involved.

**V. OPTIONS FOR IMPROVING THE AVAILABILITY OF BIODIVERSITY INFORMATION**

33. The Millennium Ecosystem Assessment has constituted a major effort to analyse and interpret data across scientific fields in a holistic way. It has made use of, and added value to, an abundance of available, but hitherto disconnected, scientific information, often through storylines. It has also pointed out uncertainties over, or gaps in, existing information. Through its multi-scale design it has attempted, on a pilot basis, to address the need for ecosystem information at all levels from local to global, thereby hoping to facilitate decision-making at each scale.

34. A major challenge for the Millennium Ecosystem Assessment was the fact that much data and information on biodiversity is fragmented, not easily accessible, exists in different formats or standards, or derived from different methods, and therefore cannot be easily integrated and compared. This makes it difficult to develop comprehensive analysis models to accurately determine the status and trends of biodiversity to guide policy analysis and decision-making.

35. Table 1 below lists the components required for an effective biodiversity observation system and compares the existing elements with a scheme that would allow real-time access to a wide range of interconnected data sources. Such a decentralized approach may effectively leverage existing efforts in a variety of sectors and eventually allow integration of data and information across diverse disciplines and scales, while concomitantly offering services that respond to specific user needs.

*Table 1: Components of a scaleable biodiversity observation system*

| <b>Components of biodiversity observation system</b> | <b>Primary biodiversity observation (ground-based and space-based; local to global)</b>   | <b>Information exchange mechanisms (methods, protocols, formats, standards)</b> | <b>Metadatabases</b>  | <b>Analysis, interpretation, value addition</b>  | <b>Products defined by user needs</b>   |
|--|---|---|---|--|---|
| <b>Existing system</b>                               | Abundance of unlinked data from systematic surveys, sampling or various observation methodologies based on different methods and usually not easily accessible (e.g. data from individual pieces of research) | Lack of existing protocols for data/information exchange                        | Limited number of meta-databases on biodiversity data sets specifically designed along common standards | Assessments based on interpretation of a fraction of existing information (e.g. Millennium Ecosystem Assessment 2002-2005) | Maps, models, reports, assessments and scenarios derived from shallow information base (e.g. scenarios on policy options for the 2010 Biodiversity Target contained in GBO-2) |

| Components of biodiversity observation system | Primary biodiversity observation (ground-based and space-based; local to global)  | Information exchange mechanisms (methods, protocols, formats, standards)  | Metadatabases   | Analysis, interpretation, value addition   | Products defined by user needs  |
|---|---|---|---|--|---|
| <b>Development needs</b>                      | Mechanism to make biodiversity data available to the public while recognizing ownership of information, and assuring the scientific quality | Wider collaborative implementation of modern information exchange mechanisms through common methods, protocols, formats and standards (e.g. the Conservation Commons) | Coherent system for biodiversity information management | Assessments based on interpretation of a broad range of data sets from various fields that are easily accessible, supporting evidence-based decision making (e.g. the Digital Earth model) | Maps, models, scenarios showing responses to specific questions derived from a broad information base |

36. Data integration efforts are currently hampered by:

- (a) Technology or data standards barriers;
- (b) Budgetary constraints;
- (c) Behavioural/cultural constraints;
- (d) Individual institutional policy barriers;
- (e) Legal barriers and the implications of intellectual property rights.

37. Action is required to address all of these constraints. This requires a collaborative effort across many sectors. An example of growing collaboration is in access to and use of the valuable data which stems from space-based observation platforms. Consultations on the user needs for an Earth Observation System for the Global Environment Outlook societal benefit area on biodiversity, i.e., a Global Biodiversity Observation System, are currently under way; however a number of challenges remain.

38. Initial experience indicates that:

(a) With 66 countries and the European Commission, as well as 46 participating organizations, the membership in the Global Environment Outlook process is less inclusive than that in the Convention on Biological Diversity or other biodiversity-related conventions and processes;

(b) In participating countries, the Group on Earth Observations process is typically driven by ministries of research, science and technology and does not necessarily respond to the needs of ministries of the environment;

(c) Needs, priorities, targets and approaches agreed within the framework of the Convention on Biological Diversity—or other biodiversity-related conventions—are not necessarily taken into account as guidance for the Group on Earth Observations consultation on biodiversity user needs;

(d) To achieve the long-term goal of a Global Biodiversity Observation System, a broad consensus between the environment and research agendas, both at national and global level, is required.

## VI. CONCLUSIONS

39. The findings of the Millennium Ecosystem Assessment demonstrate that there is a need for a significant efforts and concerted action among different international institutions to consider the full range of ecosystem services, including those for which no formal markets are established. They also underline the need for a much more coherent and sustained approach to enhancing institutional, scientific and technological infrastructures and capacities for cooperation on keeping the state of the environment under review and providing timely, accurate, credible, relevant and consistent environmental data and scientific advice on environmental governance.

40. The wide interest in subglobal assessments under the Millennium Ecosystem Assessment and their relative success in engaging decision makers suggest that there is value in supporting Millennium Ecosystem Assessment-type assessments at national and/or subregional level. These assessments should in their design take into account:

(a) The need to engage stakeholders, including local and national decision makers, in the assessment and ensure the results are easily understood by non-specialists;

(b) The particular value of Millennium Ecosystem Assessment-type assessments for capacity development among participants and stakeholders;

(c) The need to ensure transparency in the results of biodiversity assessments and, wherever possible, access to the underlying data which support these assessments;

(d) The need to ensure common data (or metadata) standards across assessments, along with the ability to scale the results from local to global analysis;

(e) The need for dedicated efforts to communicating the process and findings of the assessment;

(f) The strong potential of Millennium Ecosystem Assessment-type assessments and the conceptual framework of the Assessment to effectively function as a bridge to development and contribute to inclusion of biodiversity and ecosystem services in country development strategies and measures of human well-being;

(g) The need to realize the substantial non-market benefits gained from sustainable ecosystem management;

(h) The need to assess progress made towards established national and/or sub-regional environmental targets.

41. To ensure that data and information generated through such assessments, and those generated through other efforts, are systematically being made available for other analyses it is important to consider how to design and get support for a coherent biodiversity information management system. Such a system would greatly facilitate future regional and global assessments, which should be carried out at regular intervals. Its design should be linked to ongoing efforts in designing a coherent biodiversity-monitoring information system.

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