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INCENTIVE MEASURES: PROPOSALS ON THE APPLICATION OF TOOLS FOR VALUATION OF BIODIVERSITY AND BIODIVERSITY RESOURCES AND FUNCTIONS

Note by the Executive Secretary

EXECUTIVE SUMMARY

1.   The present note responds to the request expressed in paragraph 12 of decision VII/18 of the Conference of the Parties, on incentive measures, to explore existing methodologies for valuation of biodiversity and biodiversity resources and functions, as well as other tools for prioritization in decision-making, by preparing a compilation of existing valuation tools as well as proposals for the application of such tools, which should include the identification of options to strengthen international collaborative partnerships for assessing biodiversity values. It provides a synopsis of the requested exploration and compilation, and also provides, in an annex, the requested proposals. The full exploration is provided in an accompanying information document (UNEP/CBD/SBSTTA/11/INF/8).

2.   Valuation typically focuses on the values of the goods and services generated by biodiversity resources and functions, the so-called ecosystem services. While valuation methods attempt to measure value in monetary terms, this explicitly does *not* mean that only services that generate direct monetary benefits are taken into consideration. The application of valuation methods is needed for valuing non-marketed ecosystem services, because these services will otherwise not be taken into account in private and public decision-making. The concept of Total Economic Value (TEV) is a standard framework for describing different *types* of economic value ascribed to natural resources. It distinguishes use values (direct, indirect and option value) and non-use values (existence and bequest value). Because of their limited usefulness for the identification and assessment of those biodiversity functions that are key to the survival of global ecosystems including humans, valuation tools usually focus on the value of comparatively small (incremental) *changes* in ecosystem services that result (or would result) from management decisions or from other human activities.

3.   Substantial progress has been made in the development and application of valuation methods and the last decades have also witnessed a gradually emerging consensus on the state-of-the-art of the range of valuation methods at hand. Valuation methods are applied both in developed and in developing countries. Some techniques, the so-called "revealed preference" techniques, are based on actual observed

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*   UNEP/CBD/SBSTTA/11/1.

behaviour data, including methods that deduce values indirectly from behaviour in surrogate markets, while other techniques, the so-called "stated-preference" techniques, are based on hypothetical rather than actual behaviour data. Some techniques are broadly applicable, some are applicable to specific issues, and some are tailored to particular data sources.

4.   Revealed-preference methods include: (i) changes in productivity; (ii) cost-based approaches; (iii) hedonic analysis; and (iv) travel-cost methods. Stated-preference techniques include: (i) contingent valuation; and (ii) choice modelling. Another approach is to transfer results from one valuation case to another, similar case; this is the so-called benefits transfer approach. A brief synopsis of the different methods is provided in the table in the annex to the present note.

5.   When applied carefully and according to best practice, valuation tools can generally provide useful and reliable information on the changes in the value of non-marketed ecosystem services that result (or would result) from management decisions or from other human activities. However, data requirements may be quite demanding for a number of tools, as are the preconditions in terms of technical expertise. Moreover, conducting primary valuation studies is typically time-consuming and costly.

6.   Measures based on observed behaviour are generally preferred to measures based on hypothetical behaviour, and more direct measures are preferred to indirect measures. However, the choice of valuation technique in any given instance will be dictated by the characteristics of the case, including the scale of the valuation problem and the types of value deemed to be most relevant, and by data availability. Different approaches can be used in a complementary manner. Several techniques have been specifically developed to cater to the characteristics of particular problems, while others are very broadly applicable to a wide range of issues.

7.   With regard to the role of valuation in decision-making frameworks, different frameworks exist for prioritization in decision-making: the standard economic frameworks of cost-benefit analysis (CBA) and cost-effectiveness analysis (CEA), as well as multi-criteria analysis (MCA), deliberative and participatory approaches, and the "satisficing" approach as important non-economic frameworks. An important advantage of the valuation tools is that they provide numbers in a common (monetary) metric, which convey the message that any loss of biodiversity that is associated with the activity under consideration generates *economic* costs, which are on a par with the other, financial costs and benefits associated with the activity under consideration in CBA or CEA.

8.   With regard to the attempts, at national and international levels, to include environmental externalities into national income accounts, theoretical and methodological challenges remain in particular with regard to an adequate incorporation of biodiversity values, and further research seems to be an important means to have biodiversity losses more reflected in macroeconomic discourse.

9.   The use of formal appraisal methods and the nature of decision-making processes generally vary across countries. Even when formally documented procedures are in place it is impossible to generalize how and when different methods are most appropriate. Different methods can be used in a complementary manner. As regards valuation, it is important to apply and interpret valuation results in their appropriate context and to be aware of the pitfalls involved. Many criticisms levelled at valuation can be avoided when best practice is followed while conducting valuation studies. The main question is – given their high costs and the expertise required – how their use can be targeted at those cases where valuation studies provide an added value in terms of improved decision making. This question has been addressed in a number of members of the Organisation for Economic Co-operation and Development (OECD) by producing valuation guides and protocols.

10.   Section III of the note discusses options to strengthen international collaborative partnerships for assessing biodiversity values. Recent activities by Governments and international organizations include: the sponsoring of meetings or projects with a strong biodiversity valuation component, the sponsoring of research and of the wider application of, and dissemination of information on, biodiversity valuation, the sponsoring of information databases, and pilot projects. Options are: improving institutional capacities, capacity-building and training through international cooperation in enhancing domestic capacities, for instance, through regional workshops, and the further development and enhancement of global capacities such as international information systems and databases.

11.   Several opportunities for further research and research cooperation at national, regional and international levels exist: on further developing valuation tools, in particular stated-preference techniques and the benefits transfer approach, on the integration of biodiversity into national accounting, and on furthering our understanding of the complex links between biological diversity, biodiversity functions, and the ecosystem services that are subsequently generated.

12.   The annex to the note distils the synopsis into proposals for the application of tools for valuation of biodiversity and biodiversity resources and functions. Proposals are provided on the application and selection of valuation tools; on institutional considerations; on capacity building and training, and on further research.

SUGGESTED RECOMMENDATION

The Subsidiary Body may wish to consider adopting a recommendation along the following lines:

The Subsidiary Body on Scientific, Technical and Technological Advice,

Recognizing that biodiversity and its resources and functions provide important ecosystem services to humankind that need to be adequately recognized and taken into account in private and public decision-making,

Also recognizing that public and private decisions can be improved if they are informed of the economic value of these ecosystem services under alternative management options and involve deliberative mechanisms that bring to bear non-economic considerations as well,

Recalling that the assessment, as appropriate and applicable to circumstances of Parties, of the values of biodiversity is one of the expected outcomes of the programme of work on incentive measures adopted by decision VI/15, in order to better internalize these values in public policy initiatives and private-sector decisions,

Underlining that the development and application of practical methods to assess the changes of the value of biodiversity resources and functions, and associated ecosystem services, that result from public and private decision-making, are essential elements in meeting the 2010 target,

Also recalling that the recommendations for further cooperation endorsed by decision VI/15, *inter alia*, call for further cooperative work on valuation methodologies, including their continued exploration as well the development and refining of non-market valuation methods, and for the establishment or strengthening of information systems including on valuation methodologies,

1.   *Recommends* that the Conference of the Parties at its eighth meeting:

(a)   *Welcomes* the proposals for the application of tools for valuation of biodiversity and biodiversity resources and functions annexed to the present recommendation;

(b)   *Invites* Parties and other Governments to take, in accordance with their national policies and legislation as well as their international obligations, these proposals into consideration when considering the application of methods for assessing the changes of the value of biodiversity resources and functions, and associated ecosystem services, that result from their decision-making, including through pilot projects;

(c)   *Encourages* relevant national, regional and international organizations and initiatives to strengthen mechanisms that extend training on the valuation of biodiversity resources and functions and associated ecosystem services, in accordance with domestic needs and priorities;

(d)   *Invites* institutions and initiatives that support web-based information systems and databases on valuation, in accordance with their mandates, to fully include cases on the valuation of biodiversity resources and functions and associated ecosystem services in particular in developing countries and countries with economies in transition in their databases, and to facilitate access to the databases in particular for experts from developing countries and countries with economies in transition;

(e)   *Invites* national, regional and international funding institutions to support the building or enhancement of domestic capacity as well as training, including through pilot projects, in accordance

with the needs and priorities identified by Parties, for undertaking valuation of biodiversity resources and functions and associated ecosystem services; and to also support the further development of regional and international capacity such as regional and international information systems and databases on valuation;

(f)   *Encourages* relevant national, regional and international research institutions to strengthen research activities including research cooperation and exchange at national, regional and international levels, on, as appropriate:

(i)   Integration of the values of biodiversity resources and functions and associated ecosystem services into national accounting and decision-making;

(ii)   Conditions for validity and robustness of valuation techniques, in particular of stated-preference techniques and of benefits transfer, with a view to further improve their reliability;

(iii) The complex linkages between biodiversity, biodiversity functions, and associated ecosystem services, with a view to, *inter alia*, identify options for the development of innovative tools for the valuation of biodiversity and biodiversity functions;

(g)   *Invites* national, regional and international funding institutions to support the research activities identified in the sub-paragraph (f) above;

2.   *Requests* the Executive Secretary:

(a)   To continue, in cooperation with, and with input from, Parties, Governments and relevant international organizations, the compilation of information on methods for the valuation of biodiversity resources and functions and associated ecosystem benefits, and to disseminate this information through the clearing house mechanism of the Convention and other means;

(b)   Explore with relevant organizations and initiatives options for cooperative activities that strengthen existing information systems on valuation methodologies and existing cases for the purpose of the Convention, in accordance with annex II to decision VI/15.

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I.   INTRODUCTION

1.   In paragraph 12 of decision VII/18, on incentive measures, the Conference of the Parties requested the Executive Secretary to

> "[E]xplore, in cooperation with the Millennium Ecosystem Assessment, the Organisation for Economic Co-operation and Development and relevant international organizations, existing methodologies for valuation of biodiversity and biodiversity resources and functions, as well as other tools for prioritization in decision-making, by preparing a compilation of existing valuation tools that provides an overview of the discussion on their methodological status, if appropriate, as well as an assessment of their applicability in terms of effectiveness and capacity preconditions, and to prepare proposals for the application of such tools. These proposals should include the identification of options to strengthen international collaborative partnerships for assessing biodiversity values, especially for the refinement and advancement of valuation tools, and shall be submitted to the Subsidiary Body on Scientific, Technical and Technological Advice for its consideration at a meeting prior to the eighth meeting of the Conference of the Parties."

2.   In paragraph 8 of the same decision, the Conference of the Parties invited Parties, Governments and international organizations to submit case-studies, best practices and other information, *inter alia,* on the application of methodologies for the assessment of values of biodiversity and its functions, as well as other tools for prioritization in decision-making, to the Executive Secretary. The Executive Secretary communicated this invitation to Parties, Governments and relevant organizations by notifications 076/2004 and 077/2004 as well as 026/2005 and 028/2005. Pertinent submissions received further to this invitation were taken into consideration in the preparation of the present note. 1/

3.   In accordance with the request of the Conference of the Parties, the Executive Secretary has prepared an information document (UNEP/CBD/SBSTTA/11/INF/8) that explores existing methodologies for the valuation of biodiversity and biodiversity resources and functions, as well as other tools for prioritization in decision-making, an overview on existing valuation tools and their methodological status as well as an assessment of their applicability in terms of effectiveness and capacity preconditions. The present document provides a synopsis of this analysis. Delegates are kindly requested to refer to the referenced paragraphs of the information document for additional information. Proposals on the application of tools for the valuation of biodiversity and biodiversity resources and functions are provided in the annex to the present note.

4.   Parties and Governments as well as relevant international organizations and experts were invited, by notifications 2005-063 and 2005-066, to review the first drafts of this note as well as of the accompanying information document (UNEP/CBD/SBSTTA/11/INF/8). Paragraphs 4 to 6 of the information document provide a list of Parties, other Governments, international organizations, and experts who responded to this invitation.

II.   SYNOPSIS OF EXPLORATION OF VALUATION METHODOLOGIES

A.   General observations

5.   Value is a term that is defined and used in different ways amongst a range of academic disciplines. In economics, value and utility are used in an anthropogenic manner. It is humans who reveal

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1/   The valuable support provided by Dr. Dominic Moran in the preparation of this note is gratefully acknowledged.

value, in terms of their so-called willingness-to-pay, for instance, in the case of marketed goods and services, by the process of exchange on markets. Similarly utility is derived by humans. 2/

6.   It is noteworthy however that the term "economic" value is to be understood in a broad sense. Individuals may assign value for different reasons, and not only for the immediate benefits resulting from the commercial exploitation of biodiversity resources (as a narrow interpretation of the term "economic" may suggest). While valuation methods developed in economics attempt to measure the value of ecosystem services in monetary terms, in order to provide a common metric in which to express the benefits of the variety of services provided by ecosystems, this explicitly does *not* mean that only services which generate direct monetary benefits are taken into consideration. 3/

7.   Valuation does normally not directly address the value of biodiversity as such. Instead, valuation typically focuses on the values of the goods and services generated by biodiversity resources and functions. A comprehensive assessment of the values of ecosystem services 4/ has recently been undertaken by the Millennium Ecosystem Assessment. However, some tools for prioritization in decision-making devices, discussed below, employ non-monetary measures of value that may encompass genetic distance as a diversity indicator.

8.   Most of the different values ascribed to ecosystem services are not captured in market prices, because most ecosystem services are not traded on markets. This has also the consequence that the prices of many marketed goods and services will not adequately reflect the essential role of biodiversity in their production, which, in turn, will lead to distorted decisions by consumers and producers. Moreover, public decision-making and its allocation of public funds will also be distorted if the repercussions of governmental activities on biodiversity resources and the related ecosystem services are not adequately factored in. Hence, undertaking valuation has the potential of improving private and public decision-making as well as, under specific circumstances, of improving legal decision-making. Moreover, it has been recognized by the Conference of the Parties that economic valuation is an important tool for the targeting and calibration of other incentive measures. 5/ For instance, valuation can contribute to ensure that the effects (positive as well as negative) of incentive measures on biodiversity in other countries are duly taken into consideration in the design and implementation of these measures.

9.   The synthesis report of the Millennium Ecosystem Assessment also notes that "most resource management and investment decisions are strongly influenced by considerations of the monetary costs and benefits of alternative policy choices. Decisions can be improved if they are informed by the total economic value of alternative management options and involve deliberative mechanisms that bring to bear non-economic considerations as well".

10.   The commonly used concept of Total Economic Value (TEV) provides a framework for describing different *types* of economic value ascribed to natural resources. The framework distinguishes use values (direct, indirect and option value) and non-use values (existence and bequest value): 6/

2/   See sub-section II A of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

3/   For the following paragraphs, see sub-section II B of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

4/   The Millennium Ecosystem Assessment adopted a wide definition of ecosystem services, which includes goods under the heading "provisioning services."

5/   See decisions IV/10 A; VI/15, annex I, paragraph 22.

6/   See sub-section II C of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

(a)   *Direct-use value* is the value derived from direct use or interaction with environmental resources and services (e.g., timber, fuelwood, tourism are direct use values of a tropical forest). They involve commercial, subsistence, leisure, or other activities associated with a resource;

(b)   *Indirect-use value* relates to the indirect support and protection provided to economic activity (production and consumption) and property by the ecosystem's natural functions;

(c)   *Option value* is a type of use value in that it relates to future use of the environment or biodiversity resources. Option value arises because individuals may value the option to be able to use the biological resource some time in the future;

(d)   *Non-use value* such as existence value (sometimes also dubbed passive value) may be derived neither from current direct or indirect use of the natural resource under consideration, but instead from its ongoing existence, or from the wish to conserve it for future generations (bequest value). The concrete reasons why utility is derived from mere existence may vary and may also be based on, for instance, religious, spiritual, or ethical motives. Of all the value categories, existence or passive value is most complex in terms of quantification and its role in decision-making.

11.   Economics has developed methods to assign value to goods and services that are not traded on markets, such as the ecosystem services generated by biodiversity resources and functions. The value of these services is inferred from the direct or indirect tradeoffs or sacrifices (in terms of time, labour effort, monetary income or wealth) people are willing to make, thus revealing their willingness to pay: since individuals face income constraints, their willingness-to-pay for the resources is represented by how much of the current consumption they are willing to sacrifice.

12.   These methods are of limited usefulness for the identification and assessment of those biodiversity functions that are key to the survival of global ecosystems including humans (the so-called life support function), and that, according to many voices, should therefore be treated as fundamental constraints and not as elements of the set of possible economic choices. Valuation therefore usually focuses on the value of comparatively small (incremental) *changes* in ecosystem services that result (or would result) from management decisions or from other human activities.

B.   Valuation methods

13.   In the last two decades, substantial progress has been made in the development and application of valuation methods, which have by now reached a considerable degree of sophistication. The last decades have also witnessed a gradually emerging consensus on the state-of-the-art of the range of valuation methods at hand, which is reflected by the fact that recent handbooks and manuals on the topic provide very similar overviews and assessments of the individual tools, with differences remaining essentially on terminology and classification.

14.   Valuation methods are applied both in developed and in developing countries. According to Rietbergen-McCracken and Abaza (2000), the traditional claim that developing countries and countries with economies in transition presented too many difficulties to allow valuation methods to produce meaningful results, has been refuted in the last decade or so by a growing body of evidence. [7]

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[7]   Rietbergen-McCracken and Abaza (2000) present a number of case studies of valuation studies undertaken in Africa, Asia, Latin America and Central and Eastern Europe, some of which also deal with biodiversity resources and functions and related ecosystem services. See also IUCN (1998) for summaries of valuation studies undertaken in developing countries, and FAO (2001) for a survey of stated-preference studies undertaken in developing countries. See section III of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

15.   A recent review and assessment of valuation methods was undertaken by the Millennium Ecosystem Assessment. The remainder of this sub-section largely follows their assessment.

16.   Some techniques, the so-called "revealed preference" techniques, are based on actual observed behaviour data, including methods that deduce values indirectly from behaviour in surrogate markets, which are assumed to have a direct relationship with the ecosystem service of interest. Other techniques, the so-called "stated-preference" techniques, are based on hypothetical rather than actual behaviour data, where people's responses to questions describing hypothetical markets or situations are used to infer value based on stated willingness-to-pay. Some techniques are broadly applicable, some are applicable to specific issues, and some are tailored to particular data sources. 8/

1.   Revealed-preference techniques

Changes in productivity

17.   This widely used method (also called the derived value method) is used to estimate the value of ecosystem products or services that contribute to the production of marketed goods. The change in price of the marketed good allows deriving the value for the underlying ecosystem service. The method consists of first tracing through chains of causality so that the impact of changes in the condition of an ecosystem can be related to marketed or non-marketed goods or services. In the case of marketed goods, valuation, in a second step, is relatively straightforward. Where the impact is on a good or service that is not marketed or where observed prices are unreliable indicators of value, the valuation can become more complex.

18.   The technique is broadly applicable and flexible in using a variety of data sources. The logic of the productivity method is relatively straightforward and the technical skill to estimate such values is not likely to be an important constraint in most cases. However, its application is more complex if the science underlying the chains of causality is not well understood, and if observed prices are unreliable indicators of value

19.   As similar approach can be used to estimate the costs associated with pollution-related mortality (death) and is referred to as the human-capital approach. In this case the loss in productivity is that of human beings, measured in terms of expected lifetime earnings. Because it reduces the value of life to the present value of an individual's future income stream, the human-capital approach is extremely controversial when applied to mortality.

Cost-based approaches

20.   The costs of replacing or restoring the services provided by the environmental resource are sometimes important relevant variables in decision-making. Cost-based approaches are comparatively easy to apply if the nature and extent of physical damage expected is predictable and if the cost to replace or restore damaged assets can be estimated with a reasonable degree of accuracy, and does not exceed the value of the service in the first place.

21.   Even while there is not necessarily any relationship between the replacement or restoration cost and the actual value of the service, cost-based approaches can provide useful guidance in a number of cases, and in particular when the specific decision-making problem calls for a comparison of the costs resulting from different replacement or restoration options to meet a specific objective, and there is a general view that the benefits associated with meeting the objective outweigh the costs. In other cases, however, the enumerated conditions may put limitations to this approach.

8/   See sub-section III A of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

22.   The economic costs of an increase in morbidity due to increased pollution levels can be estimated using information on various costs associated with the increase. The estimates obtained in this manner are interpreted as lower-bound estimates of the presumed costs or benefits of actions that result in changes in the level of morbidity.

Hedonic analysis

23.   Hedonic price analysis compares the prices of similar goods, in particular real estate, to extract the implicit value that buyers place on the specific environmental attributes of the good.

24.   This method assumes that markets work reasonably well, and would not be applicable where markets are distorted by policy or market failures. Moreover, hedonic methods are particularly data demanding, and were therefore rather scarcely applied. Accordingly they are of limited applicability in many developing countries where data sets are particularly limited.

Travel cost

25.   The travel-cost method uses information on visitors' total expenditure to visit a site to derive their demand curve for the site's services. From this demand curve, the total benefit visitors obtain can be calculated.

26.   This method was designed for and has been used extensively to value the benefits of recreation. It has been applied in developing nations to model visitor choices to important natural assets such as national parks and protected areas. The data requirements for travel costs methods are relatively straightforward, and applications have been conducted with national respondents and international visitors. However, the method has limited utility in other settings.

2.   Stated-preference techniques

27.   Stated-preference techniques rely on questionnaires to infer the assigned value to ecosystem services from a representative sample of respondents. They can, in principle, be used to value any environmental benefit, and can be targeted quite accurately since they are not limited to deducing preferences from available data. An important advantage of stated-preference techniques is that they are the only techniques able to capture non-use values, which tend to be crucial in certain biodiversity contexts.

28.   Stated-preference methods have seen much methodological improvement over the past decade, in particular on the design of the surveys, through extensive pre-testing, and on avoiding different biases, such as the bias resulting from strategic respondent behaviour.

29.   Many applications of stated-preference techniques have been undertaken in developed countries, and applications in developing countries are increasing. It is noteworthy, however, that stated-preference techniques were applied, in a number of cases, in fields such as water and sanitation where much can already be inferred from actual behaviour.

30.   A potentially important limitation in terms of applying these methods to biological resources and functions is that respondents cannot typically make informed choices if they have a limited understanding of the issue in question. Choosing the right approach and the adequate intensity of efforts in improving the understanding of biological complexity of the sample group is a challenge for stated-preference methods.

31.   A careful application of these techniques is fairly demanding in terms of capacity and time. Hence, the main constraints are likely to be costs of implementation and the lack of trained specialists.

These constraints should not lead to shortcuts and lower sample sizes, as the associated savings can be counterproductive in terms of delivering less reliable results. Failure to reflect established best practice in commissioned studies will result in poor and non-credible output.

Contingent valuation

32.   Contingent valuation is carried out by asking consumers directly about their willingness-to-pay (or sometimes, willingness-to-accept) to obtain an environmental service. A detailed description of the service involved is provided, along with details about how it will be provided. The actual valuation can be obtained in a number of ways, such as asking respondents to name a figure, having them choose from a number of options, or asking them whether they would pay a specific amount.

33.   Contingent valuation methods have been the subject of severe criticism by some analysts. A "blue-ribbon" panel was organized by the United States Department of Interior following controversy over the use of contingent valuation to value damages from the 1989 *Exxon Valdez* oil spill. The report of this panel (NOAA 1993) concluded that contingent valuation can provide useful and reliable information when used carefully, and it provided guidance on doing so. This report is generally regarded as authoritative on appropriate use of the technique.

Choice modelling

34.   Choice modelling (also referred to as contingent choice, choice experiments, conjoint analysis, or attribute-based stated choice method) is a newer approach and consists of asking respondents to choose their preferred option from a set of alternatives where the alternatives are defined by attributes (including the price or payment).

35.   Choice modelling has several advantages including minimizing some of the technical problems associated with contingent valuation, such as strategic behaviour of respondents. The disadvantages associated with the technique are that the responses are hypothetical and therefore suffer from problems of hypothetical bias (similar to contingent valuation), and that the choices can be quite complex when there are many attributes and alternatives. The econometric analysis of the data generated by choice modelling is also fairly complex.

3.   Benefits transfer

36.   Benefits transfer refers to the use of estimates obtained (by whatever method) in one context to estimate values in a different context. Alternatively, the relationship used to estimate the benefits in one case might be applied in another case, by using adjusted data from the first case in conjunction with some data from the site of interest ("benefit-function transfer"). For example, a relationship that estimates tourist benefits in one park, based in part on their attributes such as income or national origin, could be used in another park, but with data on income and national origin of that park's visitors. In this connection, the term meta analysis refers to taking the data from individual studies and compiling a master database that can be analysed to explore why the studies produce different answers, i.e. to 'explain the variance'. Isolating factors that affect valuation then makes it easier to engage in benefits transfer.

37.   Benefits transfer has been the subject of considerable controversy in the economics literature, as it has often been used inappropriately. According to the Millennium Assessment, a consensus seems to be emerging that benefits transfer can provide valid and reliable estimates under certain conditions, including (i) that the commodity or service being valued be very similar at the site where the estimates were made and the site where they are applied; (ii) that the populations affected have very similar characteristics; and (iii) that the original estimates being transferred must themselves be reliable.

38. Benefits transfer has the potential to alleviate the problems of deficient primary data sets and limited funds often encountered in valuation. As was shown above, considerable efforts in time and money are often needed to meet best-practice standards and deliver credible results. By extension, high expenditure means that there will always be a limit to the number of quality studies that can be undertaken. Accordingly, the question becomes paramount on how new studies can be used more generally or, in the absence of new studies, how existing information can be borrowed for use in suitably similar policy contexts.

39. Databases containing the results of many different kinds of valuation study are now becoming available, such as the Environmental Valuation Reference Inventory (EVRI) web site maintained by Environment Canada or the ENVALUE site maintained by the New South Wales Environmental Protection Agency of Australia. These databases facilitate the task of researchers in providing off-the-shelf value estimates for a range of resources and environmental changes. These will also permit more extended meta-analysis of studies.

C. General assessment of valuation tools 9/

40. It appears that, when applied carefully and according to best practice, valuation tools can provide useful and reliable information on the changes in the value of non-marketed ecosystem services that result (or would result) from management decisions or from other human activities. Data requirements may be quite demanding for a number of tools, as are the preconditions in terms of technical expertise. Moreover, conducting primary valuation studies is typically time-consuming and costly.

41. According to the Millennium Ecosystem Assessment, measures based on observed behaviour are generally preferred to measures based on hypothetical behaviour, and more direct measures are preferred to indirect measures. However, it is also underlined that the choice of valuation technique in any given instance will be dictated by the characteristics of the case, including the scale of the valuation problem and the types of value deemed to be most relevant, and by data availability. Different approaches can be used in a complementary manner. Several techniques have been specifically developed to cater to the characteristics of particular problems, while others are very broadly applicable to a wide range of issues. Contingent valuation is potentially applicable to any issue and as such has become very widely used – probably excessively so, as it is easy to misapply. For some types of value, however, stated-preference methods may be the only alternative. Thus, existence value can only be measured by stated-preference techniques. Guidance on the appropriate use of the technique exists and should be followed closely.

42. Benefits transfer has often been used inappropriately but can provide valid and reliable estimates under certain conditions. Given the cost of undertaking primary valuation studies, benefits transfer when used cautiously is likely to be an increasingly appealing way for extending the use of valuation, including in developing countries.

D. Valuation and decision-making 10/

1. Economic frameworks 11/

43. Existing frameworks for prioritization in decision-making use valuation information to a greater or lesser extent. An important advantage of the valuation tools reviewed in the last section is that they provide numbers in a common (monetary) metric, which can thus easily be incorporated into the standard appraisal methods of cost-benefit analysis (CBA) and cost-effectiveness analysis (CEA). This

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9/ See sub-section III B of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

10/ See section IV of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

11/ See sub-section IV A of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

incorporation has an important effect. It conveys the message that any loss of biodiversity that is associated with the activity under consideration generates *economic* costs, which are on a par with the other, financial costs and benefits associated with the activity.

44.   Both CBA and CEA are common governmental appraisal methods in OECD countries and among international organizations. While the methods were originally developed for appraising basic infrastructure, many government guidance documents now include advice on the inclusion of environmental and social costs and benefits.

45.   In the last two decades there have been numerous attempts, at national and international levels, to include environmental externalities into national income accounts and, more importantly, some measure of environmental depreciation to reflect the environmental losses that occur as a result of economic activities. For instance, recent work by the World Bank along these lines has shown that several countries that perform well on conventional grounds were actually performing less well once the new measure of depreciation was included. Identification of this environmental drag on economic growth can serve as a basis for prioritizing national environmental policies and a focus on mitigation or reversal of environmentally damaging activities.

46.   However, theoretical and methodological challenges remain in particular with regard to an adequate incorporation of biodiversity values in conventional macro economic indicators of growth. For instance, many of the valuation tools at hand are simply too costly and demanding to apply them on a scale that would be needed for a *comprehensive* valuation of the annual changes in domestic biodiversity resources. Further research directed at the development of a biodiversity adjustment for national accounting seems to be an important means to have biodiversity losses more reflected in macroeconomic discourse.

2.   *Non-economic frameworks 12/*

47.   The economics approaches mentioned so far are all potentially informed by the tools for the valuation of biodiversity resources presented in the next section. In contrast, multi-criteria analysis (MCA) is more qualitative in nature but may occasionally use valuation information in the decision process. Multi-criteria analysis is in fact a family of methods that use different scoring approaches to weigh the different attributes of a decision. Participants in the analysis are typically given the criteria that define different options and are asked to score or weigh these criteria using some pre determined points system. A multi-criteria analysis may accommodate a range of social, environmental, technical, economic, and financial criteria. MCA is therefore applicable especially where significant environmental and social impacts are present, which cannot (easily) be expressed in monetary terms. MCA are often integrated with deliberative and participatory approaches and are said to facilitate such input to a larger degree than the monetary assessment tools CBA and CEA.

48.   Deliberative processes (sometimes also referred to as deliberative and inclusionary processes or DIPs) are aimed at creating better-informed decisions that are owned by and have the broad consent of all relevant actors and stakeholders. DIPs seek to build a process of defining and redefining interests that stakeholders introduce as the collective experience of participation evolves. As participants become more empowered, i.e. more respected and more self-confident, so it is assumed they may become more ready to adjust, to listen, to learn, and to accommodate to a greater consensus.

49.   There are very few applications of MCA in developing countries. In general the method is less costly because sample sizes can be kept small. However, MCA is often difficult to use and understand for non experts. Most variants require an expert to explain how the method works, and to help users to define

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12/   See sub-section IV B of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

options, criteria and weights, as well as to choose the appropriate aggregation procedure. The method also makes no claim to be searching for economically efficient outcomes.

50.   Furthermore, the method does *not* phrase environmental impacts as *economic* costs on a par with the other financial costs and benefits associated with the activity under investigation. In particular when used in conjunction with deliberative and participatory approaches, the relative weight that the outcome of these processes is given in the final decision is sometimes unclear.

51.   CBA and MCA are not mutually exclusive. CBA can be used to define a set of efficient options, that is, options where net benefits are positive (that is, gross benefits are greater than costs). Options with net economic benefits of similar magnitude could be further assessed by MCA so as to identify the various non-economic trade-offs associated with the alternative courses of action.

52.   In decision theory, the term "satisficing" is used to refer to an optimization process where *all* costs, including the cost of the optimization calculations and the cost of getting information for use in those calculations, are considered. A satisficing approach can be described as an assessment procedure to obtain an outcome that is good enough, rather than seeking the best solution. The approach can thus be contrasted with an optimizing approach that seeks to identify the "best" solution, as is the case, for example, for cost-benefit analysis or multi-criteria analysis. Such an approach could be taken in decision situations with a low level of complexity, where only few well-defined options are available, where the targets are clearly specified and where little or no trade-offs between targets are necessary.

53.   In some countries, the legal framework for liability and redress has also been an important driver for the analysis and refinement of valuation methods.

E.   Conclusions 13/

54.   Valuation studies play an increasingly important role in contemporary environmental policies, as they provide additional knowledge to support better decision-making. It is important to apply and interpret valuation results in their appropriate context and to be aware of the pitfalls involved. Many criticisms levelled at valuation can be avoided when best practice is followed while conducting valuation studies. The main question is: given their high costs and the expertise required, how their use can be targeted at those cases where valuation studies provide an added value in terms of improved decision-making.

55.   This question has in recent years been addressed in OECD countries by efforts to produce both valuation guides and protocols as well as standard environmental values for use in benefits transfer. These efforts have gone some way in terms of increasing the credibility and acceptability of valuation methods. More importantly, these resources have also simplified and reduced the cost of undertaking policy appraisal.

56.   The use of formal appraisal methods and the nature of decision-making processes generally vary across countries. Even when formally documented procedures are in place it is impossible to generalize how and when different methods are most appropriate. In general, methods such as cost-benefit-analysis seem to be less controversial, and are commonly applied, when financial costs and benefits are relatively clear to identify and when for instance social impacts are comparatively small. There seems to be a need to include decision-making tools that are more consensual and participation-oriented in particular when external costs have significant social consequences, when they are captured by traditional knowledge that is not widely available, and/or when the local socio-cultural systems pose a serious limitation to

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13/   See sub-section IV C of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

valuation based solely on economic terms. The combined utilization of different decision-making tools may often be useful.

III.   STRENGTHENING INTERNATIONAL COLLABORATIVE PARTNERSHIPS FOR ASSESSING BIODIVERSITY VALUES 14/

57.   Valuation is beginning to play a significant role in biodiversity management decisions in OECD countries. Many Governments espouse its use by defining protocols for inclusion of environmental values into decision-making, adopting voluntary or mandatory guidelines, and assigning clear responsibilities. Moreover, international organizations have advocated greater use of valuation in policy making and project design, have sponsored meetings or undertaken projects with a strong biodiversity valuation component, have sponsored research and the wider application of, and dissemination of information on, biodiversity valuation and its role in creating incentives for conservation. Several Governments have also facilitated greater use through the sponsorship of meetings and information databases sources.

58.   Valuation can often be advanced by the development of studies as pilot projects that address important domestic biodiversity resources and the services generated by key biodiversity functions, and thus help to raise the issue of biodiversity in national debates. Many countries have reached this stage, but many others have not. This critical phase requires international collaboration and enhancement of domestic capacity.

A.   *Institutional capacity 15/*

59.   A combination of poor institutional capacity and a lack of trained staff can generally be identified as the main barriers to further promotion of valuation as a biodiversity management tool, in particular in developing countries and countries with economies in transition. Institutional weakness manifests itself in poorly defined lines of responsibility and the absence of clearly defined governmental practices for appraising policy decisions.

B.   *Capacity-building and training 16/*

60.   On the governmental level, capacity needs to be enhanced for conducting the actual valuation studies, for improved oversight and auditing for quality control, as well as for putting valuation results to good use in governmental decision-making by an effective and credible follow-up. Moreover, training could also include staff of relevant non-governmental organizations.

1.   *International cooperation in enhancing domestic capacities*

61.   Most expertise in valuation is arguably located in several OECD countries that have established research institutions specifically in the area, and it appears to be important to tap into this expertise as a basis for sponsoring training arrangements such as, for instance, regional workshops on biodiversity valuation.

62.   A number of existing mechanisms to extend training on ecosystem services valuation could be strengthened:

14/   See section V of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

15/   See sub-section V A of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

16/   See sub-section V B of document UNEP/CBD/SBSTTA/11/INF/8 for additional information and references.

(a)   In many non-OECD countries, notable centres of expertise also exist whose training activities should be supported;

(b)   In many developed countries, university departments offer exchange opportunities that are normally supported by their own national development ministries;

(c)   Short-term courses are offered by other agencies and international organizations including for instance the World Bank, which offers a course in environmental economics and development policy;

(d)   Bilateral arrangements between agencies for temporary secondment is another means of extending training;

(e)   A number of web-based resources and training manuals exist and should be put to wider application.

2.   *Enhancing global capacities: international information systems and databases*

63.   Web-based databases exist which contain valuation data for use for instance in benefits transfer (see above). While benefits transfer is still under development, the use of this concept seems to be an appealing way to advance the use of valuation information in particular in resource poor countries where time and resource constraints will typically prevent extensive primary research. Fostering the wider application and further refinement of this concept should therefore be considered.

64.   Existing databases contain a variety of studies from different developing countries, but are not specifically tailored to developing country needs on the valuation of ecosystem services. Therefore, a useful collaborative initiative could be to further develop existing transfer databases and to increase cooperation among database providers with a view to increase compatibility and inter-operability, such as through the establishment of common criteria for auditing valuation work and standardized coding procedures.

C.   *Fostering research*

65.   As explained above, considerable progress has been made in the last decades in developing reliable valuation tools and protocols for their application. However, opportunities for further research and development remain, in particular with regard to the conditions for validity and robustness of stated-preference techniques and the benefits transfer approach. Furthermore, further research directed at the development of a biodiversity adjustment for national accounting seems to be an important means to have biodiversity losses reflected in macroeconomic decision-making.

66.   It was also explained earlier that valuation addresses the ecosystem services generated by biodiversity resources and functions, but not biodiversity as such. Despite recent progress made in understanding the links between biological diversity, biodiversity functions, and the ecosystem services that are subsequently generated, as summarized in the Millennium Ecosystem Assessment reports, this understanding is still limited and fragmented, with many unresolved questions remaining. Further research in addressing these important questions, including research cooperation at the international level, is therefore crucial. Importantly, new insights on the relationship between changes in biodiversity, for example through sudden shifts in ecosystem equilibriums, and the generation of ecosystem services may also lead to the development of new tools and methodologies for the valuation of biodiversity and biodiversity functions.

Annex

PROPOSALS FOR THE APPLICATION OF TOOLS FOR VALUATION OF BIODIVERSITY AND BIODIVERSITY RESOURCES AND FUNCTIONS

1.   Biodiversity and its resources and functions generate substantial ecosystem services many of which are not traded on markets and whose value is therefore not reflected in market prices. Consequently, private and public decision-making and the allocation of funds will be distorted if the repercussions of activities on biodiversity resources and functions, and the associated ecosystem services, are not adequately taken into account. This distortion is an important underlying cause of biodiversity decline. Undertaking valuation of biodiversity resources and functions and the associated non-marketed ecosystem services has the potential of improving private and public decision-making, thereby contributing to the target of the Convention to significantly reduce by 2010 the current rate of biodiversity loss.

2.   **Total Economic Value (TEV).** Most public and private resource management and investment decisions are strongly influenced by considerations of the monetary costs and benefits of alternative policy choices. Undertaking valuation should seek to address the relevant components of the Total Economic Value of non-marketed ecosystem services, bearing in mind that the concept of Total Economic Value includes both the direct and indirect use value and well as non-use value of ecosystem services and hence goes beyond the immediate benefits of commercial exploitations of biodiversity resources. Decisions can be improved if they are informed by the economic value of alternative management options and involve mechanisms that bring to bear non-economic considerations as well.

A.   *Valuation tools*

3.   A number of valuation tools are available that, when applied carefully and according to best practice, can provide useful and reliable information on the changes in the value of non-marketed ecosystem services that result (or would result) from management decisions or from other human activities (see the table below). Data requirements may be quite demanding for a number of tools, as are the preconditions in terms of technical expertise. Moreover, conducting primary valuation studies is typically time-consuming and costly.

4.   *Choice of valuation tools*. The choice of the valuation tool or valuation tools in any given instance will be informed by the characteristics of the case, including the scale of the problem and the types of value deemed to be most relevant, and by data availability. Several techniques have been specifically developed to cater to the characteristics of particular problems, while others are very broadly applicable but may have other limitations that should be taken fully into account when choosing the appropriate tool or set of tools. Different approaches can be used in a complementary manner.

5.   *Stated- and revealed-preference techniques.* In general, tools based on observed behaviour (the so-called revealed-preference techniques) are preferred to tools based on hypothetical behaviour (the so-called stated-preference techniques). Stated-preference techniques are however the only techniques that are able to capture non-use values, which tend to be important in certain biodiversity contexts, and can provide useful and reliable information when used carefully and in accordance with authoritative best practice. Their application could therefore be considered if all of the following conditions are met: (i) non-use values are expected to be an important component of the value of the ecosystem service under consideration; (ii) it can be ensured that the sample group of respondents is representative and has an adequate understanding of the issue in question; and (iii) capacity requirements for an application in accordance with best practice, including adequate skills in survey design, are met.

6.   *Cost-based approaches.* Cost-based approaches can provide useful guidance, if the nature and extent of physical damage expected is predictable and if the cost to replace or restore damaged assets, and the resulting ecosystem services, can be estimated with a reasonable degree of accuracy, and does not exceed the value of the ecosystem services in the first place. These approaches can in particular be used when the specific decision-making problem calls for a comparison of the costs resulting from different replacement or restoration options to meet a specific objective, and there is a general view that the benefits associated with meeting the objective outweigh the costs.

7.   *Benefits transfer.* Benefits transfer can provide valid and reliable estimates under certain conditions, including: (i) that the commodity or service being valued be very similar at the site where the estimates were made and the site where they are applied; (ii) that the populations affected have very similar characteristics; and (iii) that the original estimates being transferred must themselves be reliable. When used cautiously, it has the potential to alleviate the problems of deficient primary data sets and limited funds often encountered in valuation. Given the cost of undertaking primary valuation studies, the cautious application and further development of this method could therefore be supported.

B.   *Institutional considerations*

8.   *Development or improvement of institutions.* Adequate institutional arrangements can generally be identified as an important precondition to the further promotion of valuation as a tool in biodiversity management and the generation of reliable valuation studies. These arrangements should *inter alia* provide a clear assignment of responsibilities for conducting appraisal processes and auditing for quality control.

9.   *Biodiversity values and national income accounts.* In the last two decades there have been numerous attempts, at national and international levels, to include environmental externalities into national income accounts, including through satellite accounts, and to apply measures of environmental depreciation to reflect the environmental losses that occur as a result of economic activities. Such measures can serve as a basis for prioritizing national environmental policies and giving focus on mitigation or reversal of environmentally damaging activities. The development of a biodiversity adjustment for national accounting seems to be an important means to have biodiversity losses more adequately reflected in macroeconomic policy-making.

10.   *Development of national guidelines.* National valuation guidelines and protocols can be useful means to ensure that biodiversity values are adequately taken into account and/or integrated in domestic appraisal processes and income accounts. They can also ensure that valuation tools are applied in accordance with domestic conditions and can thereby contribute to increasing the credibility and acceptability of appraisal processes including the application of valuation methods.

11.   *Involvement of stakeholders as well as indigenous and local communities.* The full involvement of all relevant stakeholders as well as indigenous and local communities is another important means of increasing the credibility and acceptability of decision-making processes including the application of valuation methods. By ensuring that sample groups are representative, their full and effective involvement can also contribute to the quality of applying certain valuation tools. Institutions should therefore have mechanisms in place that ensure the full and effective involvement of relevant stakeholders as well as indigenous and local communities in appraisal processes including the application of valuation tools.

12.   *Awareness raising and incentive measures.* Identifying and assessing the value of biodiversity resources and functions and of the associated ecosystem services can raise awareness, thus creating incentives for the conservation and sustainable use of biodiversity, and can also support the adequate design and calibration of other incentive measures for the conservation and sustainable use of

biodiversity, 17/ bearing in mind that incentive measures should not negatively affect biodiversity and livelihoods of communities in other countries. Furthermore, raising awareness among all stakeholders of the value of biodiversity improves the chances for other incentive measures to be successful.

13.   *Awareness raising and pilot projects.* Undertaking valuation studies as pilot projects on key domestic ecosystems can be another effective means to raise awareness of the value of biodiversity resources and functions and associated ecosystem services, and to advance the application of biodiversity valuation in domestic decision-making procedures.

C.   *Capacity-building and training*

14.   *Capacity-building.* The effective application of tools for the valuation of biodiversity resources and functions and associated ecosystem services requires considerable capacity and technical expertise. In many countries, capacity needs to be enhanced for putting adequate institutions in place, for conducting effective appraisal processes including the valuation of biodiversity and associated ecosystem services, for improved oversight and auditing for quality control, as well as for putting valuation results to good use in governmental decision-making by an effective and credible follow-up.

15.   *Regional workshops.* Regional workshops on ecosystem valuation are an important means to exchange national experience on best practices in the valuation of biodiversity resources and functions and associated ecosystem services, and in the development of national guidelines and protocols, and to extend training.

16.   *Regional and international cooperation and training.* Training is an important component in activities to build or enhance domestic capacities. A number of mechanisms exist that extend training on the valuation of biodiversity resources and functions and associated ecosystem services, and could be further strengthened. They include:

(a)   Regional centres of expertise which offer training activities;

(b)   Long-term and short-term academic exchange programmes;

(c)   Short-term courses offered by international organizations;

(d)   Bilateral arrangements between agencies for temporary secondment;

(e)   Web-based resources and training manuals.

17.   *International databases for benefits transfer.* Web-based databases exist which collect valuation data for use in benefits transfer. As the use of this concept seems to be an increasingly appealing way to advance the use of valuation information in particular in light of the time and resource requirements for undertaking extensive primary research, fostering its further development and wider application, should therefore be considered. This could also include increased cooperation among existing initiatives with a view to ensure, in accordance with their mandates, a comprehensive coverage of cases of valuation of biodiversity resources and functions and associated ecosystem services in particular in developing countries and countries with economies in transition,.

D.   *Further research*

18.   *International research cooperation.* Considerable progress has been made in the last decades in developing reliable tools, as well as the protocols for their application, for the valuation of biodiversity

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17/   See decisions IV/10 A and VI/15, annex I, paragraph 22.

resources and functions and associated ecosystem services. However, important opportunities for further research and development remain. Research initiatives that address these opportunities and seek to establish regional or international cooperation and exchange should be supported.

19. *Biodiversity valuation and national accounting.* Further research directed at the development of a biodiversity adjustment for national accounting seems to be an important means to have biodiversity losses more reflected in macroeconomic policy-making.

20. *Valuation tools.* Further research on the conditions for validity and robustness of valuation techniques, in particular of stated-preference techniques, may contribute to further the reliability of valuation information of non-marketed ecosystem services, in particular with regard to non-use values.

21. *Benefits transfer.* Further research on the conditions for validity and robustness of benefits transfer may further advance the use of valuation information under tight time and resource constraints, which prevent extensive primary research.

22. *Links between biodiversity, biodiversity functions, and associated ecosystem services.* Despite recent progress made in understanding the links between biological diversity, biodiversity functions, and the associated ecosystem services, many questions remain unresolved. Further research in addressing these important questions is therefore warranted and may also lead to the development of innovative tools and methodologies for the valuation of biodiversity and biodiversity resources and functions.

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Table: Main valuation techniques (source: adapted from Millennium Ecosystem Assessment)

Method	Description	Applications	Data requirements	Potential challenges/limitations
Revealed-preference methods				
Change in productivity	Trace impact of change in ecosystem services on produced goods	Any impact that affects produced goods	Change in service; impact on production; net value of produced goods	Lacking data on change in service and consequent impact on production
Cost of illness, human capital	Trace impact of change in ecosystem services on morbidity and mortality	Any impact that affects health (e.g. air or water pollution)	Change in service; impact on health (dose-response functions); cost of illness or value of life	Lacking dose-response functions linking environmental conditions to health; value of life cannot be estimated
Cost-based approaches (e.g., replacement, restoration costs)	Use cost of replacing or restoring the service	Any loss of goods or services; Identification of least cost option to meet given objective	Extent of loss of goods or services, cost of replacing or restoring them	Risk to over-estimate actual value if unknown benefits are higher than identified costs
Travel cost (TCM)	Derive demand curve from data on actual travel costs	Site-specific recreation; siteseeing (e.g. protected areas)	Survey to collect monetary and time costs of travel to destination, distance traveled	Limited to described applications; difficult to use when trips are to multiple destinations
Hedonic prices	Extract effect of ecosystem service on price of goods that include those factors	Air quality, scenic beauty, cultural benefits	Prices and characteristics of goods	Requires transparent and well-working markets, and vast quantities of data; very sensitive to specification
Stated-preference methods				
Contingent valuation (CV)	Ask respondents directly their WTP for a specified service	In particular in cases where non-use values are deemed to be important	Survey that presents scenario and elicits WTP for specified service	Ensuring sample representativeness important but large survey is time-consuming and costly; knowledge of respondents may be insufficient; potential sources of bias in responses; guidelines exist for reliable application
Choice modelling	Ask respondents to choose their preferred option from a set of alternatives with particular attributes	In particular in cases where non-use values are deemed to be important	Survey of respondents	Similar to CV, but minimizes some biases; analysis of the data generated is complex
Other methods				
Benefits transfer	Use results obtained in one case in a different, but very similar case	Any for which suitable and high-quality comparison studies are available; applicable in cases where savings in time and costs outweigh certain loss of accuracy (e.g., rapid assessments)	High-quality valuation data from other, similar sites	Can be wildly inaccurate when not used cautiously, as many factors may still vary even when cases seem "similar"