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LIABILITY AND REDRESS IN THE CONTEXT OF PARAGRAPH 2 OF ARTICLE 14 OF THE CONVENTION ON BIOLOGICAL DIVERSITY

*Synthesis report on technical information relating to damage to biological diversity and approaches to
valuation and restoration of damage to biological diversity, as well as information on
national/domestic measures and experiences*

Note by the Executive Secretary

I. INTRODUCTION

1. In paragraph 3 of decision VIII/29, the Conference of the Parties requested the Executive Secretary to gather and compile technical information relating to damage to biological diversity and approaches to valuation and restoration of damage to biological diversity as well as information on national/domestic measures and experiences, focusing in particular on the issues identified in the conclusions of the Group of Legal and Technical Experts on Liability and Redress (Expert Group), and to prepare a synthesis report for examination by the ninth meeting of the Conference of the Parties in accordance with paragraph 2 of article 14 of the Convention.

2. In paragraph 2 of the same decision, the Conference of the Parties invited Parties and other Governments to submit to the Executive Secretary examples of national/domestic legislation and case-studies relating to liability and redress for damage to biological diversity, including approaches to valuation and restoration, and requested the Executive Secretary to compile this information and disseminate it through the clearing-house mechanism. The submissions received further to this information were taken into account in the preparation of this report.

3. This report is structured into four sections. The individual elements in the request of the Conference of the Parties are addressed in sections II-IV. Damage to biological diversity is addressed in section II below. To ensure a more logical presentation, approaches to the restoration of damage are addressed in section III, while approaches to the valuation of damage are addressed in section IV. Each

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section starts with a brief review of the relevant issues identified by the Expert Group in its report (UNEP/CBD/8/27/Add.3), which will serve to structure the remainder of each section.

II. DAMAGE TO BIOLOGICAL DIVERSITY

A. Introduction

4. In its report, the Expert Group concluded that the following elements *inter alia* should be taken into consideration if the Conference of the Parties wished to provide further guidance in the area of damage to biological diversity:

- (a) Change may not necessarily equal damage;
- (b) To qualify as damage, the change needs:
 - (i) To have an adverse or negative effect;
 - (ii) To be present over a period of time, that is, it cannot be redressed through natural recovery within a reasonable period of time;
- (c) Baselines are needed against which to measure change;
- (d) Other methods are needed for measuring change where baselines are not available;
- (e) The need to distinguish between natural variation and human-induced variation;
- (f) The need to reflect the definition of biological diversity in Article 2 of the Convention, that is, “the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”;
- (g) The need to factor in the definition of biodiversity loss in decision VII/30;
- (h) The issue of thresholds of significance of the damage.

5. Establishing the damage to biodiversity as a result of an incident is a fundamental step in applying liability and redress rules. The determination would provide the basis to establish the extent of actual restoration needed, any additional complementary and compensatory measures, then, their cost and, ultimately, who will be liable for them.

6. The determination is not purely a legal issue. Establishing damage to biodiversity would be facilitated by liability and redress rules, but is largely a technical issue drawing on a number of disciplines including ecology and economics.

7. A clear definition of damage to biodiversity would be central to the application of any liability and redress rules.

B. Defining damage to biological diversity

8. To trigger the application of rules on liability and redress a definition of what constitutes damage to biodiversity would be necessary.

9. The Convention's definition of biological diversity focuses on the variability between and within genes, species and ecosystems. Determining the extent and significance of changes to the variability attribute of biodiversity may be difficult to undertake. Therefore, as with conservation and sustainable use activities which have as their goal the conservation of the maximum amount of genetic, species and ecosystem diversity, efforts in the liability and redress area may need initially to focus on biodiversity's tangible manifestations which contribute to diversity in the first place: its component genes, populations of species and ecosystems.

10. Focussing on the components of biodiversity, and the goods and services they provide, has some precedent both within the Convention and in State practice. For example the Conference of the Parties has defined "biodiversity loss".

11. Though developed in a different setting, the definition of biodiversity loss could be a useful starting point for elaborating a definition of damage to biodiversity for purposes of liability and redress rules. This was recognized by the Expert Group in its conclusion that the definition of biodiversity loss in decision VII/30 needs to be factored in. 1/

1. *Loss of biodiversity*

12. The term's origin derives from the need to assess progress towards the target to achieve, by 2010, a significant reduction in the current rate of biodiversity loss. The Conference of the Parties defined "biodiversity loss" as "The long-term or permanent qualitative or quantitative reduction in components of biodiversity and their potential to provide goods and services, to be measured at global, regional and national levels." 2/

13. Though developed to measure the Convention's implementation, key elements of the definition are useful in a liability and redress context. For example, liability and redress rules for biodiversity might usefully refer to a measurable, qualitative or quantitative reduction in components of biodiversity.

14. Liability and redress rules might also address not only the physical loss of components of biodiversity *per se*, but the loss of their ability to provide actual or potential goods and services. Consequently, a link would be built to ecosystem structure and function, as described within the Millennium Assessment, and the ecological and economic contributions of ecosystems to environmental quality and human well being. This would be a key consideration in any assessment of damage and consequent determinations needed to establish primary, complementary and compensatory measures to redress damage to biodiversity and the subsequent attachment of liability (see section III).

15. Finally, like the definition of biodiversity loss, a definition of damage to biodiversity could usefully include an element addressing the duration of damage, reflecting that duration of loss needs to be of an enduring nature. This parallels a conclusion also reached by the Expert Group: to qualify as damage, change needs "to be present over a period of time, that is, it cannot be addressed through natural recovery within a reasonable period of time". 3/

2. *Change must be adverse or negative*

16. Another element of a definition of damage to biodiversity could be that the change observed must be adverse or negative. This implies that in assessing change to biodiversity, a determination must be made regarding the consequences of the incident and its impacts. This was highlighted by the Expert Group's more general conclusions that change may not necessarily equal damage 4/ and that change needs to have an adverse or negative effect. 5/

3. *Change must be significant*

17. The Expert Group also concluded that “the issue of thresholds of significance of the damage” was an element that could be considered for further guidance. This is in keeping with the well-established principle that for liability to arise, damage needs to exceed a *de minimis* threshold of change. 6/ Below the threshold a responsible party would not be liable. 7/

18. Determining whether damage meets or exceeds a threshold of significance is part technical determination and part policy determination. 8/ The decision reflects objective and subjective judgements and, where legislation exists, would be made against a legal definition of damage to biodiversity. 9/

19. While the notion that damage should rise above a threshold before triggering liability is well established, from a practical methodological and technical standpoint it is a complex determination. 10/ Notwithstanding the complexities involved, such a determination could involve, among other things, considering the character of the impact and the importance or value of the resources lost or the uses foregone. 11/

C. *State practice*

20. Responses to Notification 2006-032 received by the Secretariat, which invited “Parties and other Governments to submit to the Executive Secretary examples of national/domestic legislation and case-studies relating to liability and redress for damage to biological diversity, including approaches to valuation and restoration”, indicated that the concept of damage to biodiversity as applied to liability and redress is a relatively new and still evolving concept. For example, no respondent country indicated that its legislation defined damage to biodiversity in the context of variability.

21. Instead, as the examples that follow indicate, States have focussed their liability and redress rules more generally on damage to the environment or, more specifically, on damage to natural resources. In both cases these more traditional approaches to defining environmental damage include references to the components of biodiversity and the services that they provide.

Argentina

22. In its submission, Argentina indicated that under its General Law on the Environment, “environmental damage” is defined as “any significant alteration that negatively modifies the environment, its resources, the ecosystem balance or the collective goods and values”. 12/

European Union

23. In its submission, the European Commission referred to Directive 2004/35/CE of the European Parliament and of the Council on environmental liability with regard to the preventing and remedying of environmental damage. 13/ The EU Liability Directive’s fundamental aim is to hold operators whose activities have caused environmental damage financially liable for remedying the damage.

24. Damage to biodiversity is not defined. However, the definition of “environmental damage” makes reference to components of biological diversity deemed to be a priority within the European Union. These are protected species and natural habitats, in particular, those addressed by the EU’s respective directives on habitats and birds. Damage to these components of biological diversity “is any damage that has significant adverse effects on reaching or maintaining the favourable conservation of such habitats or species”. 14/

25. Furthermore, “damage” is defined as “a measurable adverse change in a natural resource or a measurable impairment of a natural resource service which may occur directly or indirectly”. ^{15/} Natural resources are “protected species and natural habitats, water and land”. ^{16/}

26. The trigger for the applicability of the liability and redress rules is premised on damage to protected species and natural habitats having “significant adverse effects” on reaching or maintaining the species’ or habitats’ favourable conservation status. ^{17/}

Criteria are provided in annex I of the directive against which to assess the significance of the incident’s effects. They are categorised in terms of three broad areas: (a) Conservation status at the time of the damage; (b) Services provided by the amenities they produce; and (c) Capacity for natural regeneration. ^{18/} Criteria are also provided in annex I whereby damage would not need to be classified as significant. ^{19/}

United States of America

27. In its submission, the United States of America recognised that any liability and redress rules for damage to biodiversity need to have a clear definition of damage. Furthermore, at minimum, the elements of the definition must reflect that the change affects variability and that the change is negative.

28. At the same time the submission pointed out that the United States does not have domestic legislation specifically relating to damage to biodiversity *per se*. Instead, the United States’ legislation refers to damage to “natural resources” whose various definitions include components of biodiversity such as fish, wildlife and other biota. However, it noted that like many countries its legal rules are capable of identifying and addressing damage to biodiversity.

29. In the United States, an assessment regime exists for determining restoration for certain forms of natural resource damage. The determination is accomplished through a “natural resources damage assessment”, the general techniques for which are applied by competent governmental authorities pursuant to the statute and regulations applicable to the situation.

30. The United States’ submission provided two statutory examples where natural resources damage assessments are applied. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) ^{20/} addresses injuries to natural resources from hazardous substances. The Oil Pollution Act (OPA) ^{21/} addresses injuries to natural resources caused by oil spills.

31. According to the submission CERCLA and its regulations define injury as “a measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of the natural resource”. The applicable regulations note that the term injury encompasses other phrases such as “destruction” and “loss”. On the other hand, OPA defines injury as “an observable or measurable adverse change in a natural resource or impairment of a natural resource service”.

32. The United States’ approach also does not explicitly require that change be significant. Instead, the trigger is simply an injury that is a measurable, short-or-long term, adverse change.

D. Assessing damage

33. Damage to biodiversity from an incident would need to be assessed in order to determine whether liability and redress rules apply. In effect, the assessment would provide evidence that damage has occurred. It would also provide evidence of causation: that the particular incident at issue resulted in the damage identified. Finally, the assessment would provide the basis for determining the extent of restoration and complementary measures that could be taken to redress the damage.

34. A review identified three primary steps to assessing damage to natural resources that could be adapted to the biodiversity context: (a) Identifying the damage; (b) Establishing the pre-incident or baseline conditions; and (c) Comparing the damage identified against the baseline.

1. Identifying the damage

35. An assessment to identify damage would ideally review changes to biodiversity at genetic, species and ecosystem levels. Such a review would also likely distinguish between natural and human induced changes. This would be in keeping with the Expert Group's conclusion that natural and human-induced variations need to be distinguished in order to determine whether change can be characterised as damage for purposes of liability and redress.

36. Steps to identify the damage to biodiversity could be drawn upon directly or, where necessary, adapted from other fields such as environmental impact assessment (EIA). Specialists would draw together physical, chemical biological, socio-economic, cultural and other data. ^{22/} Possible sources of information would include field studies, lab studies and literature reviews. The data would be assessed and then lead to a set of conclusions of the resulting impacts of the damage.

While many methodologies are potentially applicable, typical parameters drawn from the EIA field that could be adapted and applied in a systematic way to identify the damage to biodiversity and assess its impacts could include reviewing the: (a) Nature of the changes (positive, negative, direct, indirect, cumulative); (b) Magnitude of the changes (severe, moderate, low); (c) Extent/location of the changes (area/volume covered, distribution); (d) Timing of the changes; (e) Duration of the changes (short-term, long-term, intermittent, continuous); (f) Reversibility/irreversibility of the changes; and (g) Significance of the changes (at the appropriate geographic scale e.g., local, regional, global). ^{23/}

2. Establishing pre-incident or baseline conditions

37. The Expert Group's conclusion that baselines are needed against which to measure change ^{24/} complements the well-established principle that damage needs to be measured against a reference point or "baseline". A baseline establishes the "pre-incident" status of the resources that have been damaged. The baseline can also provide the reference point for restoration activities.

38. The broad areas of examination for establishing a baseline can include determining the pre-incident status of biodiversity at genetic, species and ecosystem levels, keeping in mind that baseline conditions are dynamic. ^{25/} Biodiversity composition, structure and key processes, as well as ecosystem services could be reviewed. ^{26/} Key ecosystem processes and services provided, including ecological functions and human/economic uses, are particularly important to identify. ^{27/}

39. The information needed could come from a variety of sources depending on the circumstances. Sources could include scientific surveys and assessments, traditional ecological knowledge and research publications. National biodiversity strategies and action plans, protected area management plans, species recovery plans and pre-existing environmental impact assessments may also be possible sources of information.

40. There are at least three techniques for establishing a baseline. ^{28/} Using the "historical baseline" technique, a baseline independent of a reference site or population can be established. It is based on compiling common knowledge or historical data. The "local reference" technique pairs one or more reference sites with one or more of the sites under assessment. Each assessment site is compared to the reference site. The "reference population" technique identifies a reference population of sites or organisms least exposed to "stressors" and then compares them to the assessment site.

41. An important consideration is that the “baseline trend” might not be static, but could have been changing at the time of the incident. One challenge of establishing a baseline therefore is to determine the baseline trend keeping in mind that pre-incident baseline trends can be constant, increasing or fluctuating. ^{29/}

Measuring change without a baseline

42. In most situations, establishing a baseline is a fundamental condition to assessing damage to the environment and biodiversity after an incident takes place. However, the Expert Group recognised that there may be instances when establishing a baseline will not be possible because of a lack of pre-incident information on the status of biodiversity. In these cases it concluded “other methods are needed to measure change where baselines do not exist”. ^{30/}

43. In their submissions no country provided information on how this might be accomplished, nor were any examples found from a literature review.

3. *Comparing the damage identified against the baseline*

44. Comparing the damage identified against the baseline condition would be the final step in the assessment process. At this step, the determination would likely be made whether the damage reaches a level of significance that triggers the applicable liability and redress rules.

E. State practice

Canada

45. In its submission, Canada noted that it does not have a separate statute providing rules for liability and redress for damage to biological diversity. It continues to rely on common law and civil code as its basic sources of causes of action.

46. A 2004 decision of the Supreme Court of Canada offered some insight regarding assessing environmental damage. In the *Canfor* case, the Court upheld the decision of a trial judge to dismiss the case on the basis of an absence of evidence to quantify a distinct ecological or environmental loss. However, according to the Canadian submission, the Supreme Court “noted that evidence about the nature of the wildlife, plants and other organisms protected by the environmental resource in question, the uniqueness of the ecosystem, the environmental services provided or recreational opportunities afforded by the resource, or the emotional attachment of the public to the damaged or destroyed area could have been provided”.

European Union

47. In its definition of environmental damage, which includes damage to protected species and natural habitats, the European Liability Directive notes the significance of the effects of damage is to be assessed against a baseline condition. ^{31/} The “baseline condition” is defined as “the condition at the time of the damage of the natural resources and services that would have existed had the environmental damage not occurred, estimated on the basis of the best information available”. ^{32/}

Mexico

48. In its submission, Mexico noted that under its *General Law on Wildlife* the restoration of damage to wildlife and habitats consists of re-establishing the conditions prior to the damage. ^{33/} In addition, it noted that Article 421 ^{34/} of its penal code states that a judge can impose on anyone of commits an

environmental crime the necessary conditions to re-establish the conditions of the “natural elements” that constitute affected ecosystems, as they were before the crime. 35/

United States of America

49. In the United States, establishing a baseline is part of a broader natural resources assessment undertaken in response to an incident. The United States’ submission explained that injury is determined as a deviation from a baseline. 36/

50. Under its rules “baseline” means the condition or conditions that would have existed at the assessment area had the incident under investigation not occurred. The submission further stated that the regulations detailing the procedures under the OPA specify that baseline data may be estimated using historical data, reference data, control data or data on incremental changes, alone or in combination.

51. Under CERCLA, natural resource damage assessments occur in three stages (1) injury determination, (2) injury quantification and (3) damage determination. The second step - injury quantification - is the assessment step, which characterizes the injury in terms of a reduction in natural resource services from a baseline state, as well as the amount of time needed to return to the baseline. Determining the pre-incident baseline physical, chemical and biological conditions involves considering the conditions that would have been expected at the assessment area had the incident not occurred, taking into account natural processes and those that result from human activities.

III. APPROACHES TO THE RESTORATION OF DAMAGE TO BIOLOGICAL DIVERSITY

A. Introduction

52. In its report the Group of Legal and Technical Experts concluded that if the Conference of the Parties wished to provide further guidance on restoration of damage to biological diversity, a number of elements should be taken into consideration.

53. For example, it recognised that there were various categories of restoration measures - such as primary and compensatory restoration - that could be used.

54. Where it is feasible, primary restoration should be the preferred approach or focus it concluded. It also concluded that it would be useful to “canvas” the “range of options for primary restoration currently used at national and international levels”.

55. It went on to conclude that the “development of criteria by which appropriate options/approaches can be selected and tailored to specific circumstances” could also be considered, while suggesting some of “the criteria that could be relevant for the selection of a particular option: effect on public health and safety; the cost effectiveness; likelihood of success; likelihood that it would prevent future damage; the length of time it would take for restoration to occur.”

56. However, it also recognised that “Where primary restoration is not possible or reasonable, other methods of redress should be considered, such as complementary methods of restoration and/or monetary compensation for irreversible damage on the basis of criteria to be developed.” It concluded “The award of monetary compensation as a means to redress irreversible damage to biological diversity requires further consideration”.

57. The Expert Group's conclusions support the more general theory and practice that there is a range of approaches to redress damage to natural resources and, by extension, damage to biodiversity. The choice and application of one or more of these approaches would depend on the situation.

58. Liability and redress rules could outline a process to facilitate the choice and application of an approach, while defining the respective roles and responsibilities of competent governmental authorities, responsible parties and civil society in the process. Liability and redress rules could also provide guidance on how to make the determination itself.

B. Basic Concepts: Primary, complementary and compensatory measures for damage to biodiversity

59. Literature reviewed, and examples of State practice examined, indicate that the trend is to establish liability and redress rules that work to ensure the primary (or actual) restoration of natural resources, and their related services, to their pre-incident conditions in order to make the environment and the public "whole" again.

60. In addition, where primary restoration to baseline conditions is not possible or practical on the affected site, or if it is simply not possible to reach pre-incident conditions at the affected site, the trend is for so-called "complementary measures" to be taken - typically off-site. Such indirect methods of redress, such as protecting or improving natural resources and/or services at an alternative location, would complement primary restoration. Among other things complementary methods would be dependent on equivalency determinations, including scaling, to ensure that the alternatives offer, for example, an equivalent ecological value compared to the resources or services lost. Resource-to-resource or service-to-service and economic valuation approaches are frequently used depending on the circumstances.

61. Finally, the survey also indicated that liability and redress rules could include "compensatory" measures for "interim losses" suffered by the public or the environment between the time when the damage occurs until the time primary restoration or complementary measures have taken effect. Approaches differ depending on the policy goals promoted by the liability and redress rules in place.

62. For example, compensation could include additional improvements at the damaged site or an alternative site or, in lieu of this, financial compensation for lost or damaged natural resources and services could be considered when in-kind approaches are not feasible. Compensatory mechanisms could also be used to reimburse a governmental agency's direct and indirect costs associated with, for example, assessing damage, planning and monitoring restoration measures and administrative overheads.

Monetary compensation for irreversible loss of biodiversity

63. Developing criteria for monetary compensation when biodiversity is irreversibly lost, was an issue upon which the Expert Group concluded needed further exploration.

64. Conceptually it might be characterised as an issue of compensation for interim losses. In other words, if primary restoration methods were not possible on-site, restoration to the baseline would never be achieved. Therefore, by extension of the concept underlying compensatory mechanisms for interim losses, interim losses where on-site biodiversity is lost would continue indefinitely.

65. At least in theory this could obligate the responsible party to compensate for interim losses indefinitely. Whether monetary compensation - either as a stream of compensation or as a one-off lump sum - might be appropriate is a policy decision that would then be reflected in liability and redress rules.

66. In their submissions to the Secretariat, two countries noted specifically that their legal systems have the potential to address irreversible losses involving damage to biodiversity. In its submission, Argentina noted that its General Law on the Environment has provisions on environmental damage, compensation and restoration and liability. Notably, when damage to biodiversity is irreversible, compensation would be deposited into a still to be created environmental compensation fund. 37/

67. In its submission, Mexico noted that where it proves impossible to restore damage to wildlife and its habitat to pre-incident conditions, article 108 of its General Law on Wildlife, requires payment of compensation to the programmes, projects or activities responsible for restoration, conservation and recuperation of species and populations. 38/

C. Primary restoration as the preferred focus or approach of redress

68. The Expert Group's conclusion that primary restoration should be the preferred approach or focus of redress when biodiversity has been damaged is in keeping with evolving theory and practice more generally applied when natural resources and the services that they provide are damaged or lost. It is premised on the general principle of taking on-site measures to directly return the damaged natural resources, and associated services, to their pre-incident or baseline conditions.

69. Liability and redress rules could outline a process whereby primary restoration options are identified and evaluated. This could include steps to identify, categorise and choose the technical options for primary restoration, keeping in mind that the option chosen would likely be case specific, and would be dictated by the public policy goals the liability and redress rules were designed to achieve. A range of primary restoration options could be identified and categorised.

70. A generic process was proposed in a report 39/ commissioned by the European Commission as an input into the development of the European Liability Directive. Drawing from the United States' approach and standard project appraisal guidance, the report proposed criteria for the evaluation process. Some of these same criteria coincidentally parallel the Expert Group's conclusions.

71. The criteria against which to screen options include: (a) Cost; (b) Extent to which the damaged resource would be returned to its baseline; (c) Likelihood of success; (d) Extent to which future damage would be prevented and the extent to which collateral damage from implementation would be avoided; (e) Extent to which more than one natural resource and/or service is benefited; and (f) Effect on public health and safety. 40/

72. In weighing the different options against the criteria, the report notes that:

It is not possible to have a general rule that says that one criterion is more or less important than another, since this is likely to depend on the type and scale of damage and the resource and the relative performance of restoration options against the restoration target. Some combination of the above criteria can be sufficient to select the preferred option that meets the restoration target. 41/

73. The report went on to propose that if two or more options would result in the same outcome, a cost-effectiveness analysis could be applied to pick the option that is most cost effective.

74. An evaluation process would help to take information from a damage assessment to determine what options would be available to address the damage.

1. Nature conservation value

75. The European Commission report noted that the process to categorise and select primary restoration options could also take into consideration the "fundamental aspects of a site that are

considered important to nature and natural resources conservation”. 42/ Because they have been widely applied in other contexts, particularly in the United Kingdom, the report spotlighted the possible use of ten criteria developed by Derek Ratcliffe in 1977 that could be useful in measuring such values in a liability and redress context.

76. The Ratcliffe Criteria help to describe a site in terms of its: (a) size, (b) diversity, (c) naturalness, (d) rarity, (e) fragility, (f) typicalness, (g) recorded history, (h) position in an ecological unit, (i) potential value, (j) intrinsic appeal. Such an evaluation could help establish a baseline, identify restoration targets, and determine primary restoration options, including the extent of natural recovery versus active restoration to be used on the site.

2. *Natural recovery versus active restoration*

77. The evaluation process would also help to answer questions about the extent to which recovery should be left to natural processes and/or actively assisted. Central to this is understanding the nature of the natural resources found on the site, and the services that they provided, and estimating how long it may take to return the injured natural resources and/or services to the baseline condition. While natural recovery may limit or eliminate the need for active restoration, with the potential to limit primary restoration costs to the responsible party, these may be offset by interim losses generated by the length of time it takes for natural recovery to bring the site back to the baseline condition.

3. *Analysing costs and benefits of primary restoration options*

78. The Expert Group hinted in its conclusions that the reasonableness of a primary restoration option could be a determinant in choosing other methods of redress: “Where primary restoration is not possible or reasonable, other methods of redress should be considered”. 43/ One measure of reasonableness could be the cost of the measures proposed.

79. The decision to choose a particular restoration option - whether primary, complementary or compensatory - implies that the benefits of restoration equal or exceed the costs. 44/ The benefits of primary restoration are the restored ability of the damaged natural resource to provide services that benefit the public. 45/ Costs of primary restoration will vary with the magnitude of damage, the complexity of restoration and the restoration option chosen. 46/

80. In instances where a determination needs to factor in cost considerations, cost-benefit analysis techniques could be applied. Cost-benefit analysis is described further in paragraph 116 below.

81. The European Commission report notes that liability and redress rules will determine the extent to which the cost of proposed restoration options will factor into the decision-making process. It points out, for example, that costs *per se* do not play a determining role in the United States’ decision making on primary restoration: restoring to the baseline is a legal obligation despite the costs. 47/ In contrast, costs are considered in the United States’ decision making for compensatory measures.

82. Under the European Liability Directive the choice of “reasonable” remedial options includes factoring in the cost of implementing primary, complementary or compensatory remediation measures. 48/ What’s more, in the EU the competent authority has the discretion to decide that no further remedial measures should be taken if, for example, “the cost of the remedial measures that should be taken to reach baseline condition or similar level would be disproportionate to the environmental benefits to be obtained.” 49/

D. State practice

European Union

83. Article 7 of the European Liability Directive applies to the determination of remedial measures. Operators are obliged to identify potential remedial measures and submit them to the competent authority for approval, unless the competent authority has already taken action. 50/ The identification process is to be in accordance with annex II (Remedying Environmental Damage).

84. The competent authority decides upon which remedial measures are to be implemented also in accordance with annex II. The competent authority is guided in its decision by among other things the nature, extent and gravity of the environmental damage and to the possibility of natural recovery. Risks to human health are also to be considered. 51/

85. Annex II provides the common framework for deciding upon measures to remedy environmental damage. 52/ In relation to protected species and habitats, remedying environmental damage is achieved by using primary, complementary and compensatory remedial measures to restore the environment to its baseline condition.

86. Primary remediation measures return the damaged natural resources and/or impaired services to, or towards, baseline conditions. 53/

87. Complementary remediation measures compensate in instances where primary remediation does not result in fully restoring the damaged natural resources and/or services. 54/ Their purpose is to provide “a similar level of natural resources and/or services, including, as appropriate, at an alternative site, as would have been provided if the damaged site had been returned to its baseline condition.” 55/ An alternative site should be geographically linked to the damaged site where possible.

88. Compensatory remediation measures compensate for “interim losses” of natural resources and/or services. They are measured from the date the damage occurs to the point in time primary remediation has achieved its full effect. 56/ Interim losses are “losses which result from the fact that the damaged natural resources and/or services are not able to perform their ecological functions or provide services to other natural resources or to the public until primary or complementary measures have taken effect. It does not consist of financial compensation to members of the public.” 57/

89. Annex II clarifies the relationship between the three types of remediation. If primary remediation does not restore the environment to baseline conditions, complementary remediation needs to take place. In all cases, compensatory remediation will be undertaken, as appropriate, to compensate for interim losses.

90. Annex II also provides criteria to guide the identification of remedial measures and for choosing the appropriate remedial measures.

91. The section in annex II addressing the identification of remedial measures notes that primary remedial options are to be comprised of “actions to directly restore the natural resources and services towards baseline condition [sic] on an accelerated time frame, or through natural recovery.” 58/

92. The identification of complementary and compensatory measures is significantly more complicated. Klaphake 59/ described the approach outlined in Annex II of the European Liability Directive as step-wise, comprised of four steps, whereby the next step is chosen if the prior one is not applicable or practicable:

(a) First step: Identify actions that provide natural resources and/or services of the same type, quality and quantity as those damaged. “Resource-to-resource” or “service-to-service” equivalence approaches are the first choice for determining equivalency.

(b) Second step: Determine alternative natural resources and/or services if the first step is not possible.

(c) Third step: Use alternative valuation techniques if the first and second steps are not possible. The competent authority can specify the method to be used, such as monetary valuation to determine the extent of alternative complementary and compensatory measures. This represents the so-called “value to value” approach. 60/

(d) Fourth step: If step three is possible, but valuation cannot take place in a reasonable period of time or at a reasonable cost, the competent authority can choose remedial measures whose cost is equivalent to estimated monetary value of the lost natural resources and/or services. 61/ This reflects the so-called “value to cost” approach but the competent authority is not limited to this method of valuation. 62/

93. The section in annex II addressing choice of remedial measures specifies the criteria for choosing “reasonable” remedial measures using best available technologies. These are essentially the same as those listed in paragraph 71 above, but also include:

(a) The extent to which each option takes into account “relevant social, economic, and cultural concerns and other relevant factors specific to the locality; and

(b) The geographical linkage to the damaged site. 63/

94. Annex II also provides the flexibility to choose primary remedial measures that do not fully restore damage to the baseline condition, or restore it more slowly, provided appropriate complementary or compensatory measures are increased “to provide a similar level of natural resources and/or services as were foregone”. 64/ It notes, for example, that this would be the case when equivalent natural resources and/or services could be provided elsewhere at a lower cost.

United States of America

95. The United States’ approach from a process standpoint, at least according to commentators 65/, appears to be clearer than the approach reflected in the European Liability Directive, despite the latter’s conceptual derivation from the former. What’s more it leaves discretion to the trustee to choose appropriate approaches and methodologies to ultimately achieve primary restoration and compensation for interim losses.

96. For example, in the United States, none of the applicable statutes describe how injured resources are to be restored. 66/ This point is further exemplified by CERCLA and the OPA, statutes whose regulations provide tools to assist a trustee’s determination.

97. The basic idea is to develop a reasonable range of restoration alternatives, including the no action alternative, and then select one based on a number of factors. 67/ The seminal handbook 68/ on the natural resources damage assessment process describes the factors under the CERCLA regulations as explaining: (a) Technical feasibility; (b) The relationship of expected costs to expected benefits; (c) Cost effectiveness; (d) Results of actual or planned response actions; (e) Potential for collateral injury from the proposed action; (f) The natural recovery period; (g) The ability of the resources to recover; (h) Potential effects on human health and safety; and (i) Compliance with various policies and laws. The OPA regulations add: (a) The extent to which the restoration goals and objectives are met; and (b) Likelihood of success.

98. In an important contrast to the European approach, cost is not a determining factor for selecting a primary restoration alternative, even though it is reflected in several of the factors applied. ^{69/} However, like the European approach, the United States' approach contemplates compensation for natural resources and/or services lost to the public for the period of time from the incident's occurrence until they are fully restored to the baseline condition.

99. For interim losses a distinction is evident, however, between the CERCLA and OPA approaches. The CERCLA uses "compensable value" to describe the use and non-use values lost to the public as a result of the injury to natural resources and the services they provide. ^{70/} On the other hand, the OPA uses "compensatory restoration" to describe the means to capture interim losses and requires the trustee, where ever possible, to use resource-to-resource or service-to-service approaches to determine the amount of compensation necessary. ^{71/}

100. The applicable statutes do not require trustees to follow any specified rules to determine interim losses. They can opt to follow guidance in the regulations accompanying the statutes. ^{72/}

101. The CERCLA regulations are useful in that they provide detailed guidance for economic valuation techniques to calculate the value of interim losses. They list a number of methodologies that could be used to determine compensable economic values. ^{73/} Some of these techniques are described in more details in Section III of this paper on valuation.

102. Ideally, the total value of a natural resource - reflecting its use and non-use values - would be evaluated.

103. Determining which economic valuation methodology to use would involve examining: (a) The types of services lost; (b) The type of resource(s) injured; (c) Availability of information for the valuation technique; and (d) The cost of applying the valuation technique. ^{74/} The goal would be to choose the appropriate methodologies to elicit the values of the loss of the services. ^{75/}

104. The OPA regulations are more specific on resource-to-resource and service-to-service based approaches. ^{76/} A good example of a service-to-service approach is Habitat Equivalency Analysis, which is described further in paragraph 120 below. It is used for determining the appropriate amount of compensation for interim losses of habitat resources. ^{77/}

IV. APPROACHES TO VALUATION OF DAMAGE TO BIOLOGICAL DIVERSITY

A. Introduction

105. In its report, the Expert Group concluded that the following elements should *inter alia* be taken into consideration in further work on the concept of valuation of damage to biodiversity:

- (a) Valuation is tied to the definition of damage;
- (b) Where components of biological diversity can be restored, the costs of the restoration measures can be the basis for valuation of the damage to such components;
- (c) Placing a value on irreversible damage is novel in the context of current international regimes, but there may be useful precedents from other fields (e.g. damage to architectural heritage) and at the national level. The issue of placing a value on irreversible damage requires further consideration;
- (d) In non-market valuation techniques, spiritual and cultural values may be relevant;

(e) Valuation techniques may need to be adapted to national needs;

(f) The outcome of the work on valuation techniques by the Subsidiary Body on Scientific, Technical and Technological Advice could make an important contribution to any work under paragraph 2 of Article 14 on valuation of damage to biodiversity.

106. The remainder of this section will to a considerable extent draw upon the work on valuation techniques undertaken by the Subsidiary Body on Scientific, Technical and Technological Advice, consistent with element (f) above, in particular decision VIII/25 and the annexed Options for the Application of Tools for Valuation, as well as Technical Series no. 28 *An exploration of tools and methodologies for valuation of biodiversity and biodiversity resources and functions* ^{78/} and the literature reviewed therein. It will also use selected publications on the role of valuation in a liability context, ^{79/} as well as pertinent information on national legislation.

B. Valuation and the definition of damage

1. Definition of biological diversity

107. Valuation is a particular challenge if focus is given to damage to the *variability* among living organisms among all sources – the definition of biological diversity as provided in Article 2 of the Convention. The Group of Experts noted that a mere change in the state of biological diversity might not necessarily constitute damage. To constitute damage, the change had to result in an adverse or negative effect and it should be measurable. ^{80/} Assessing and valuing such adverse or negative effects with regard to variability would require an in-depth understanding of the interdependencies between the structure and diversity of biotic communities and the functioning of ecosystems. However, this understanding is still limited and fragmented, which impedes the assignment of both ecological levels of importance (that is, of ecological value) to variability as such, as well as the assignment of economic values. ^{81/}

108. Valuation will be comparatively less problematic if focus is given to damage to components of biodiversity, in accordance with Article 7 (a) and annex I of the Convention, and their potential to provide goods and services. ^{82/} Indeed, valuation typically focuses on the economic value of the goods and services generated by biodiversity resources and/or functions – the so-called ecosystem services. ^{83/}

2. Types of value

109. The types of value that are considered relevant for defining damage will also influence any valuation exercise. Commercial values will be easier to assess, as there is typically price information available for the biodiversity component, e.g., a commercially valuable species. For non-commercial values, sophisticated non-market economic valuation tools need to be applied. ^{84/} Some of these tools use the price information of surrogate goods – provided that such surrogate goods exist; for instance, goods that were produced with the biodiversity component as an input. ^{85/}

110. It is noteworthy that economic valuation recognizes that individuals may assign value for different motives, and not only for the immediate benefits of commercial exploitations. The framework commonly used for describing the different types of economic value ascribed to natural resources is known as Total Economic Value (TEV). ^{86/}

3. Resource status prior to impact

111. The status of the resources prior to the incident leading to the damage may also influence the damage values that are derived. For instance, a given negative impact could arguably result in a higher

damage value when affecting a pristine ecosystem than when affecting an ecosystem which was already degraded by human-made activities. Identifying and measuring the baseline conditions of the affected biodiversity components will be a critical precondition not only for defining damage – as has already been noted by a number of experts at the meeting of the Expert Group, ^{87/} but also for the valuation of damage. The Expert Group noted that information on baseline conditions for determining and measuring change was not available in many situations. ^{88/}

4. *Scope of damage*

112. The scope of the damage, or the extent to which damage arises across different scales, will also have an impact on its valuation, in particular on the choice of the adequate valuation instrument or set of instruments. Any one valuation method is unlikely to be able to cover all of the different types of value that are relevant in a given situation and different techniques may also be required whenever there is a need to evaluate the same biodiversity resource at different scales. For example, the range of services of a forest, the type of value of those services, and their actual value to a local community living at the fringe of the forest, may differ significantly from the types of value and the value that relevant national, regional or international stakeholders or communities may assign to the different services of the same forest. Hence, the selection of the method or methods should therefore depend on which types of value, and on which level, are deemed to be or to be likely the most important ones in a given situation.

C. *Cost of restoration measures a basis for valuation*

113. The Expert Group noted that, where the affected biodiversity components can be restored, the cost of restoration measures could be used as a basis for the valuation of damage. In Italy for instance, the Environmental Damage Assessment foresees the monetary valuation of the environmental damage by using the cost of primary restoration plus the cost associated with the interim loss of the natural resources and the ecosystem services provided by them, during the period between the beginning of the deterioration and the complete recovery to the baseline condition. These interim losses, in turn, are estimated by the compound legal interest accrued on the primary remediation cost during the unavailability period (interest rate net of inflation). ^{89/}

114. Even while there is not necessarily any relationship between the cost and the value of a damaged ecosystem service, cost-based approaches – including not only restoration but also replacement costs – are typically depicted as being part of the set of available economic valuation tools, as they can provide useful guidance in particular when the specific decision-making problem calls for a comparison of the costs resulting from all different replacement or restoration options, within a cost-effectiveness-analysis. ^{90/} In a liability context, cost estimates could be used in the determination and selection of a cost-effective set of adequate remedial measures, consisting of primary, compensatory and, if necessary, complementary measures. ^{91/}

115. Important preconditions for using this approach are that the nature and extent of the physical damage needs to be known, and that the costs to replace or restore the damaged assets can be estimated with a reasonable degree of accuracy. Another important assumption, which may not be valid in all cases, is that the cost considered does not to exceed the economic value of the service, taking into account possible further environmental damages resulting from the restoration or replacement activity. Otherwise, it would lead to an overestimation of its value. ^{92/}

116. The latter precondition is of particular interest in an environmental liability context, as reference is frequently made to avoid remedial options with “excessive” cost – that is, with costs which are disproportionate to the expected environmental benefits. ^{93/} For instance, in the European Liability Directive, the competent authority is entitled to decide that no further remedial measures should be taken if, *inter alia*, the cost of the remedial measures that should be taken to reach baseline condition or similar level would be disproportionate to the environmental benefits to be obtained. ^{94/} From an economic

perspective, undertaking a cost-benefit-analysis would in principle be an effective tool to ascertain such lack of proportion. ^{95/} It would however imply the valuation of the environmental benefits resulting from specific remediation measures – and hence go beyond cost-based approaches. ^{96/}

D. Placing a value on irreversible damage

117. Using the terminology introduced in section III above, on approaches to the restoration of damage, damage could be understood as being irreversible whenever primary restoration – that is, restoration of the same resource and in the same physical location – is technically not feasible, or only to a limited extent. In these cases, other measures would need to be undertaken for complete remediation: complementary remediation – that is, restoration not of the same but of similar level of resources and/or services, including, as appropriate, at another site – as well as additional measures beyond complementary restoration, in order to compensate for any remaining interim losses (compensatory remediation).

118. Choosing the adequate amount of complementary and compensatory remediation raises questions of commensurability across resources or biodiversity components, and possibly across ecosystems, independently of whether economic or non-economic valuation methods are chosen.

1. Non-economic valuation

119. As regards non-economic valuation, the European Liability Directive foresees the preferential use of the so-called resource-to-resource or service-to-service equivalence approaches in determining the scale of complementary and compensatory remedial measures. ^{97/} Actions that provide natural resources and/or services of the same type, quality and quantity as those damaged shall be considered first, whereas alternative natural resources and/or services shall be provided whenever provision of the same natural resources/services is not possible – for example, a reduction in quality could be offset by an increase in the quantity of remedial measures.

120. In the United States, both CERCLA and OPA foresee the remediation of damage either through primary or compensatory restoration – the latter again being undertaken with a view to compensate for the interim loss of natural resources. ⁹⁸ Under OPA, when evaluating compensatory restoration actions, trustees must consider actions that provide services of the same type and quality, and of comparable value as those injured. If, in the judgment of the trustees, compensatory actions of the same type and quality and comparable value cannot provide a reasonable range of alternatives, trustees should identify actions that provide natural resources and services of comparable type and quality as those provided by the injured natural resources. When determining the scale of restoration actions that provide natural resources and/or services of the same type and quality, and of comparable value as those lost, trustees must consider the use of a resource-to-resource or service-to-service scaling approach. ^{99/}

121. In the literature, reference is frequently made to a number of classification and scoring systems, which are already used, or could be used, in such scaling of restoration options. One such approach is Habitat Equivalency Analysis (HEA), specifically designed and applied by the United States National Oceanic and Atmospheric Administration (NOAA) to determine the compensation the public is due to reconcile injuries to the ecosystem and the lost services the ecosystem provides to the biotic component. ^{100/}

122. Several Members States of the European Union ^{101/} have experience in the *ex-ante* identification of in-kind compensation measures in the context of land use planning, with two methodologies being referenced in the European Union White Paper ^{102/} and MEP and EFTEC report ^{103/} as potentially useful models for valuing damage in a liability context.

123. Approaches that are to some extent comparable to the Andalusian compensation table described in endnote 102 exist in other jurisdictions. In Argentina for instance, decrees 860/96 and 861/96 specify monthly compensatory payments to landowners that shall indemnify them for negative impacts resulting from oil extraction infrastructure installed on their land, and resolution 584/98 of ENARGAS, the national regulatory agency for the natural gas sector, specifies a formula for calculating mandatory payments by the natural gas industry for the operation of natural gas pipelines. 104/

2. Economic valuation

124. The annex to decision VIII/25 provides an overview of existing economic valuation tools, their typical application, data requirements, and potential challenges or limitations. 105/ According to the Millennium Ecosystem Assessment, some techniques have been specifically developed to cater to the characteristics of particular problems, while other are more widely applicable but have other limitations that need to be taken fully into account when choosing the appropriate tool or set of tools. 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 technique). However, existence values, which may be deemed important in certain biodiversity contexts, can only be assessed with stated-preference methods 106/ – see paragraphs 133 to 135 below for further discussion. In other instances however, for instance if the focus is on the quantification of indirect use values, the application of other (less controversial) valuation tools would often seem to be preferable.

125. Under the natural resource damage assessment regulations of NOAA, trustees may use valuation whenever they determined that neither resource-to-resource nor service-to-service scaling is appropriate. Under the valuation approach, trustees must explicitly measure the value of injured natural resources and/or services, and then determine the scale of the restoration action necessary to produce natural resources and/or services of equivalent value to the public. If such valuation of the lost services is practicable, but valuation of the replacement natural resources and/or services cannot be performed within a reasonable time frame or at a reasonable cost, trustees may estimate the dollar value of the lost services and select the scale of the restoration action that has a cost equivalent to the lost value. 107/

126. The European Liability Directive largely follows this approach. Alternative valuation techniques shall be used if it is not possible to use the first choice resource-to-resource or service-to-service equivalence approaches. The competent authority may then prescribe the method, for example monetary valuation, to determine the extent of the necessary complementary and compensatory remedial measures. If valuation of the lost resources and/or services is practicable, but valuation of the replacement natural resources and/or services cannot be performed within a reasonable time-frame or at a reasonable cost, then the competent authority may choose remedial measures whose cost is equivalent to the estimated monetary value of the lost natural resources and/or services. 108/

127. In Canada, a 2004 decision of the Supreme Court clarified that innovative valuation techniques could be accepted by the courts when and if properly applied. 109/ The case under review involved a forest fire caused by Canfor, a major forest licence holder, damaging forests set aside for environmental purposes in sensitive areas established by the State. The court ultimately rejected the State's claim for compensation for the environmental damage as being *overly arbitrary and simplistic* (it was simply a 20% premium on the commercial value of the lost timber), but also found that less arbitrary techniques were available and would have to be carefully considered by the courts when and if properly presented. They noted that legitimate claims that are properly pleaded should not be 'strangled' because of overly technical objections to novel methods of assessment. 110/

3. *International context*

128. In the context of temporary damage to natural resources without commercial value, some conclusions of the United Nations Compensation Committee with regard to its work on Iraq's liability for environmental damage from the invasion and occupation of Kuwait are pertinent. In its June 2005 report and recommendations on the so-called "F4" claims, ^{111/} the Panel of Commissioners considered the role of valuation methodologies. ^{112/} Claimants had relied on statistical evidence and calculations as well as valuation methodologies for estimating the extent of damage and quantifying the losses to be compensated, including in particular the HEA methodology referenced above. Iraq contended that these methodologies were not acceptable, as they are "novel and untried" and are "shot through with uncertainty". Iraq stated that there is no general national practice to support the use of such methodologies and, consequently, that it cannot be argued that the use of these methodologies is reflected as a general principle of law recognized by civilized nations.

129. Reacting to these contentions, the Panel expressed the view that international law does not prescribe any specific and exclusive methods of measurement for awards of damages for internationally wrongful acts by states. The overall criterion is always that of effective reparation for the wrongful act. Hence, even in the absence of precise rules or prescriptions on the methods for evaluating damage, courts and tribunals are entitled and required to evaluate damage and determine appropriate compensation, relying on general principles for guidance, particularly the principle that reparation must, as far as possible, wipe out all the consequences of the illegal act. The Panel recognized that there are inherent difficulties in attempting to place a monetary value on damaged natural resources, particularly resources that are not traded in the market. With specific regard to HEA, the Panel recognized that it is a relatively novel methodology, and that it has had limited application at the national and international levels. For these reasons, the Panel considered that claims presented on the basis of HEA or similar methodologies of resource valuation should be accepted only after the Panel had satisfied itself that the extent of damage and the quantification of compensation claimed are appropriate and reasonable in the circumstances of each claim.

130. However, the Panel did not consider that these potential difficulties are a sufficient reason for a wholesale rejection of these methodologies, or for concluding that their use is contrary to international law principles. The Panel reiterated its previous statements that remediation measures for damaged resources should focus on primary restoration, in terms of the restoration of ecological functioning. Consequently, compensatory restoration measures should be considered only where there is sufficient evidence that primary restoration will not fully compensate for any identified losses. It is only in such cases that HEA would be considered as a helpful tool in determining how much compensatory restoration is necessary and feasible in the circumstances.

E. Relevance of spiritual and cultural values in non-market valuation techniques

131. As has been noted earlier, economic valuation recognizes that individuals may assign value for different motives, and not only for the immediate benefits of commercial exploitation. There are many reasons why people are indirectly observed to, or directly state that they are willing to, make tradeoffs between their endowment (in terms of time, labour effort, monetary income or wealth) and safeguarding non-marketed natural resources, including safeguarding specific levels of ecosystem services – and these reasons may well include spiritual and cultural motives. What matters is that people are willing to make tradeoffs. As long as this is the case, spiritual and cultural values would be captured by the concept of Total Economic Value, and in particular by the concept of existence value (that is, the value associated with the ongoing existence of an asset without actual use or intention of future use) and, with regard to cultural values, also by indirect use values (e.g., the aesthetical values associated with beautiful landscapes and natural heritage sites). ^{113/}

132. Existence values can only be captured by revealed-preference methods such as contingent valuation or ranking. These methods are relatively controversial. A “blue-ribbon” panel was organized by in the United States following controversy over the use of contingent valuation to value damages from the 1989 *Exxon Valdez* oil spill. ^{114/} According to the Millennium Ecosystem Assessment, the report of this so-called NOAA panel concluded that contingent valuation can provide useful and reliable information when used carefully, and it provided guidance thereon that is generally regarded as authoritative on appropriate use of the technique. ^{115/}

133. However, individuals may not feel they can express spiritual or cultural values in the form of tradeoffs that are usually presented to them in revealed preference techniques. ^{116/} In those cases, the application of tools that are more consensual and participation-oriented could be considered. Such deliberative processes include participatory appraisal, focus groups, Delphi approach, consensus conferences and citizen’s juries. These methods are aimed at creating better informed decisions that are owned by and have the broad consent of all relevant actors and stakeholders. They 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. Deliberative and participatory approaches can be used in conjunction with economic valuation tools ^{117/} or with multi-criteria analysis. ^{118/}

F. Adaptation of valuation techniques to national needs

134. The Conference of the Parties at its eighth meeting, in the preamble to decision VIII/25, expressed its cognizance that a careful application of valuation methodologies is fairly demanding in terms of capacity and time, and that the main constraints, especially for developing countries, in particular the least developed and small island developing States among them, and countries with economies in transition are likely to be costs of implementation, understanding the complementarity of approaches, and the lack of trained specialists.

135. These capacity constraints would seem to define a need, in particular for the groups of countries referenced in the decision, for valuation techniques that are comparatively easy and fast to understand and to use. It is also noted that a cost-benefit criterion should be applied, as appropriate, to the undertaking of the valuation study itself, and that, in principle, valuation techniques or tools should be used when the anticipated incremental (including long-term) improvements in the decision on how to best remediate damage to biodiversity, are commensurate with the costs of undertaking the valuation. ^{119/}

136. One comparatively inexpensive and fast method is benefits transfer – the use of estimates obtained (by whatever method) in one site or case to estimate values in a different site or case. Benefits transfer has been the subject of considerable controversy in the economics literature, as it has often been used inappropriately. According to the Millennium Ecosystem Assessment, a consensus seems to be emerging that benefit transfer can provide valid and reliable estimates under certain conditions. ^{120/} As estimates based on benefits transfer can be generated with considerably less time and resources than by undertaken primary studies, one may in some decision-making contexts be willing to trade quick and cheap numbers against a certain loss in accuracy, provided that minimum quality standards are met. For instance, if valuation data is available on the biodiversity damage and its restoration in a very comparable other case, benefits transfer may provide at least an indication on whether the costs of proposed restoration measures are excessive when compared with the expected benefits of these measures. ^{121/}

137. According to in the Millennium Ecosystem Assessment, 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. ^{122/} MEP and EFTEC provides a list of criteria to consider when deciding on the use of valuation tools,

which may inform the identification of national needs with regard to application of valuation tools and their adaptation to national circumstances: 123/

- *Likely magnitude of the damage, critical importance of the affected environmental resources, significance of the impact, and the types of value to be measured:* the more important these criteria are, the greater the need for a comprehensive analysis;
- *Extent to which restoration can be undertaken with resources of the same type, quality, and value:* the less similar and the more distant the resources identified for compensatory restoration, the harder it will be to reasonably ensure that restoration provides an appropriate level of remediation without applying some valuation methodology;
- *Applicability of individual tools to the issues at hand:* (i) scoring/weighting systems are sufficient if the service-to-service approach and cost-effectiveness analysis is applicable for choosing restoration options; (ii) choice modelling (but not necessarily including monetary expressions of damage) if the public's view on the relative importance of aspects of damage and restoration is deemed important; (iii) economic valuation of biodiversity damage or benefits of restoration if cost-benefit analysis or value-to-value scaling is deemed necessary, with benefits transfer if data/information on similar sites is available and the conduct of primary valuation otherwise;
- *Availability of data and time, and cost considerations;*
- *Timing of the valuation exercise,* in order to avoid strategic replies in stated-preference techniques.

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- 1/ See decision VII/30 and UNEP/CBD/COP/8/27/Add.3, annex, paragraph 6 (g).
- 2/ Decision VII/30.
- 3/ UNEP/CBD/COP/8/27/Add.3, annex, paragraph 6 (b) (ii).
- 4/ *Ibid*, paragraph 6 (a).
- 5/ *Ibid*, paragraph 6 (b) (i).
- 6/ UNEP/CBD/EG-L&R/1/2/Rev.1 paragraph 19.
- 7/ *Idem*.
- 8/ United Nations University (UNU) Environmental Impact Assessment Course Module, at: http://eia.unu.edu/course/?page_id=173.
- 9/ *Idem*.
- 10/ Klaphake, A. (2005) "The Assessment and Restoration of Biodiversity Damages", *Journal for European Environmental & Planning Law*; Vol. 2(4); Germany, p.275.
- 11/ UNU *op.cit*.
- 12/ Honorable Congreso de la Nación Argentina, Artículo 27 of the *Ley General del Ambiente* at: <http://www.ambiente.gov.ar/?aplicacion=normativa&IdNorma=85&IdSeccion=0>.
- 13/ "Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage", see <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0035:EN:NOT>.
- 14/ *Ibid*, Article 2 (1) (a).
- 15/ *Ibid*, Article 2 (2).
- 16/ *Ibid*, Article 2 (12).
- 17/ *Ibid*, Article 2 (1) (a).
- 18/ *Ibid*, Annex 1. More specific criteria include: (a) The number of individuals, their density or the area covered; (b) The role of the particular individuals or of the damaged area in relation to the species or to the habitat conservation, the rarity of the species or habitat (assessed at local, regional and higher level including at Community level); (c) The species' capacity for propagation (according to the dynamics specific to that species or to that population), its viability or the habitat's capacity for natural regeneration (according to the dynamics specific to its characteristic species or to their populations); and (d) The species' or habitat's capacity, after damage has occurred, to recover within a short time, without any intervention other than increased protection measures, to a condition which leads, solely by virtue of the dynamics of the species or habitat, to a condition deemed equivalent or superior to the baseline condition.

- 19/ The following does not have to be classified as significant damage: (a) Negative variations that are smaller than natural fluctuations regarded as normal for the species or habitat in question; (b) Negative variations due to natural causes or resulting from intervention relating to the normal management of sites, as defined in habitat records or target documents or as carried on previously by owners or operators; and (c) Damage to species or habitats for which it is established that they will recover, within a short time and without intervention, either to the baseline condition or to a condition which leads, solely by virtue of the dynamics of the species or habitat, to a condition deemed equivalent or superior to the baseline condition. *Ibid.*
- 20/ For more information see Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): <http://www.epa.gov/superfund/policy/cercla.htm>.
- 21/ For more information see Oil Pollution Act (OPA): <http://www.epa.gov/emergencies/content/lawsregs/opaover.htm>.
- 22/ UNU *op.cit.*
- 23/ *Idem.*
- 24/ UNEP/CBD/COP/8/27/Add.3, annex, paragraph 6 (c).
- 25/ See Sloomweg R., Kolhoff A., Verheem R. and Hoft R. (2006) *Biodiversity in EIA and SEA-Background Document to CBD decision VIII/28. Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment*, Commission for Environmental Assessment, The Netherlands, p.35.
- 26/ *Ibid.*, p.37.
- 27/ Sloomweg, Kolhoff, Verheem and Hoft (2006), *op cit.*, p.36; see generally MacAlister Elliot and Partners Ltd (MEP) and Economics for the Environment Consultancy Ltd (EFTEC) (2001), "Study of the Valuation and Restoration of Damage to Natural Resources for the Purpose of Environmental Liability", European Commission Directorate-General Environment—1488-REG/R/03/B, at: http://ec.europa.eu/environment/liability/pdf/biodiversity_main.pdf.
- 28/ Lee V.A., Bridgen P.J. and Environment International Ltd Washington (2002), *The Natural Resource Damage Assessment Deskbook: A Legal and Technical Analysis*, Environmental Law Institute, Washington, DC, p.245.
- 29/ *Ibid.*, p.289.
- 30/ UNEP/CBD/COP/8/27/Add.3, annex, paragraph 6 (d).
- 31/ Directive 2004/35/CE, *op cit.*, Article 2 (1) (a).
- 32/ *Ibid.*, Article 2 (12).
- 33/ Government of Mexico (2002), "Ley General de Vida Sylvestre", Article 108: <http://www.diputados.gob.mx/LeyesBiblio/doc/146.doc>.
- 34/ Government of Mexico, "Código Penal Federal", Article 421: <http://info4.juridicas.unam.mx/ijure/tcfed/8.htm?s=> .
- 35/ Submission from Mexico to the Executive Secretary.
- 36/ Submission from the United States of America to the Executive Secretary.
- 37/ Government of Argentina "Ley General Del Ambiente": <http://www.ambiente.gov.ar/?aplicacion=normativa&IdNorma=85&IdSeccion=0>.
- 38/ Government of Mexico (2000), *op cit.*
- 39/ MEP and EFTEC (2001), *op cit.*
- 40/ *Idem.*
- 41/ UNEP/CBD/COP/8/27/Add.3.
- 42/ MEP and EFTEC (2001), *op cit.*
- 43/ UNEP/CBD/COP/8/27/Add.3, Annex, paragraph 8 (a).
- 44/ MEP and EFTEC (2001), *op cit.*
- 45/ *Idem.*
- 46/ *Idem.*
- 47/ *Idem.*
- 48/ Directive 2004/35/CE, *op cit.*, annex II section 1.3.1.
- 49/ *Ibid.*, annex II section 1.3.3 (b).
- 50/ *Ibid.*, Article 7 paragraph 1.
- 51/ *Ibid.*, Article 7 paragraph 3.
- 52/ *Ibid.*, annex II, chapeau.
- 53/ *Ibid.*, annex II section 1 (a) and section 1.1.1.
- 54/ *Ibid.*, annex II section 1 (b).
- 55/ *Ibid.*, annex II section 1.1.2.
- 56/ *Ibid.*, annex II section 1(c).
- 57/ *Ibid.*, annex II section 1 (d).
- 58/ *Ibid.*, annex II section 1.2.1.
- 59/ Klaphake (2005), *op cit.*, p.272.
- 60/ *Ibid.*, p. 273.
- 61/ Directive 2004/35/CE, *op cit.*, annex II section 1.2.3.
- 62/ Klaphake (2005), *op cit.*, p.274.
- 63/ Directive 2004/35/CE, *op cit.*, annex II section 1.3.1.
- 64/ Directive 2004/35/CE, *op cit.*, annex II section 1.3.2.
- 65/ Klaphake (2005), *op cit.*, p.271.

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- 66/ Lee, Bridgen and Environment International Ltd (2002), *op cit.*, p.292.
- 67/ *Ibid*, p.292.
- 68/ *Idem*.
- 69/ *Ibid*, p.293.
- 70/ *Ibid*, p.297.
- 71/ *Idem*.
- 72/ *Ibid*, p.296.
- 73/ These include (i) Market price methodology; (ii) Appraisal methodology; (iii) Factor-income approach; (iv) Travel-cost method; (v) Hedonic pricing; (vi) Unit value approach; (vii) Contingent valuation methodology; (viii) Conjoint analysis; and (ix) Benefits transfer. *Ibid*, p.304.
- 74/ *Ibid*, p.303.
- 75/ *Idem*.
- 76/ *Ibid*, p.298.
- 77/ *Ibid*, p.300.
- 78/ Secretariat of the Convention on Biological Diversity (2007): *An exploration of tools and methodologies for valuation of biodiversity and biodiversity resources and functions*. Technical Series no. 28, Montreal, Canada, 71 p. Publication of the report was made possible through the financial support of the Government of the Netherlands.
- 79/ Referenced in the submissions from the European Commission and the IUCN Environmental Law Centre to the Executive Secretary.
- 80/ See UNEP/CBD/COP/8/27/Add.3, paragraph 19; submission of India to the Executive Secretary.
- 81/ See decision VIII/25 Annex, section D; SCBD (2007), section V C. See for a recent discussion also Marris, E. (2007): "Conservation priorities: What to let go." *Nature* 450, 152-155.
- 82/ Such focus is provided in the definition of biodiversity loss of decision VII/30, paragraph 2.
- 83/ Decision VIII/25 annex. A comprehensive assessment of the values of such ecosystem services has been undertaken by the Millennium Ecosystem Assessment. This assessment was based on a wide understanding of ecosystem services, which includes goods under the concept of "provisioning services". For a recent overview article prepared in the context of the DIVERSITAS EcoServices project, see Perrings et al. (under preparation): *The valuation of ecosystem services*. Mimeo.
- 84/ Submission of India to the Executive Secretary.
- 85/ See examples discussed further below.
- 86/ For a summary as well as for typical examples in a biodiversity context and the valuation tools that could be applied for each type of value see SCBD (2007), *op cit.*, p.12.
- 87/ See UNEP/CBD/COP/8/27/add.3, paragraph 22.
- 88/ *Ibid*, paragraph 19.
- 89/ See Di Marco, G; A. Maggiore (2007): *Environmental Damage Assessment*. Mimeo.
- 90/ SCBD (2007), *op cit.*, p.16; Submission of India to the Executive Secretary. For instance, in an often-quoted case, the New York City water authority avoided spending US \$6-8 billion on water purification plants by investing US\$1.5 billion for protection and restoration of the upstate watershed of the Catskills Mountains. Here, the decision-making problem was simply to minimize the cost of meeting an objective, by comparing the costs resulting from replacement and from restoration options. See Postel, S. L., B. H. Thompson, Jr. (2005): "Watershed Protection: Capturing the Benefits of Nature's Water Supply Services." *Natural Resources Forum* 29/2, p.98.
- 91/ See section III above for an explanation of the concepts of primary, compensatory and complementary measures of redress. Directive 2004/35 annex II, provides, in annex II, paragraph 1.3.1, a list of criteria relating to the costs of the remedial options and to their expected quality (such as, for instance, the likelihood of success, the extent to which the option will prevent future damage, and avoid collateral damage as a result of implementing the option, or the extent to which benefits to each component of the natural resource and/or service, which would support identifying cost-effective measures and choosing lower-cost options. See for a discussion Klaphake, A. (2005): *op cit.*, "Some remarks on environmental damages under Directive 2004/35." p.274.
- 92/ SCBD (2007), *op cit.*, p.16.
- 93/ See MEP and EFTEC (2001), *op cit.*, p.23.
- 94/ See Directive 2004/35/CE, annex II, paragraph 1.3.3 (b). The U.S. legislation for damage assessment does not allow a discussion of cost excessiveness for primary restoration option, as meeting the primary restoration target is a legal obligation – see MEP and EFTEC (2001), *op cit.*, p.34.
- 95/ It was for instance called for in MEP and EFTEC (2001), *op cit.*, p.23 and 35-37.
- 96/ Klaphake (2005), *op. cit.*, at p.274, notes in this regard that "such a cost-benefit test is certainly justified from an economic standpoint and useful to avoid disproportionate burdens to individual causers – note that the European Liability Directive do not provide for a cap on restoration efforts." The submission of India to the Executive Secretary notes that if cost-benefit-analyses is used economic valuation techniques need to be implemented unless there is a good justification for using non-monetary expressions of benefits.
- 97/ See Directive 2004/35/CE, annex II, paragraph 1.2.2.
- 98/ Submission of the United States of America.
- 99/ United States National Oceanic and Atmospheric Administration (1996): Restoration Planning. *Guidance Document for Natural Resource damage Assessment*. Annex I: OPA Regulations, p.A-19-20. See

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- <http://www.darrp.noaa.gov/library/pdf/rpd.pdf>.
- 100/ The method is specifically used in cases of habitat injury when the service of the injured area is ecologically equivalent to the service that will be provided by the replacement habitat, under the service-to-service approach – it hence includes services that are functionally equivalent, though not the same type and quality. The use of conversion factors can be used for equating dissimilar services, which could be calculated from ratios of functional or structural characteristics. See <http://www.csc.noaa.gov/coastal/economics/habitatqu.htm> for more information.
- 101/ In Germany, federal impact mitigation regulation requires the restoration or in-kind compensation of the significant negative environmental impacts of planned projects. The model of the Federal State of Hesse is used to assess a compensatory fee for the negative effects of a planned intervention if primary restoration measures cannot be taken or will not fully compensate the loss. It is based on a classification of the territory into various different types of biotopes. These biotope types (approximately 180) are evaluated on the basis of eight different characteristics, which reflect the environmental value of the biotopes, and are each awarded a point value. The amount of compensation payable for injuries to the biotopes covered is finally reached by multiplying the final number of points attributed to a certain biotope with the amount of square meters affected and the average restoration cost per square meter.
- A compensation table is used in Andalucía, Spain, to assess damages for injuries to protected animal species. The table specifies monetary figures to be paid in case of an injury to a covered animal species, which reflect the cost of re-introduction of the animals concerned and are based on the average cost of maintaining and preserving the species covered. However, according to MEP and EFTEC (2001), it is unclear, inter alia, under what conditions the model is being applied, whether monetary payments are earmarked for specific purposes, how often the model is used, and whether the model has been tested in court.
- 102/ White Paper, paragraph 4.5.1.
- 103/ MEP and EFTEC (2001), *op cit.*, Annex B.
- 104/ Submission of Argentina to the Executive Secretary. It does not seem to transpire from the legislation on which basis the relevant numbers (monthly payments in case of the regulatory decrees, coefficients in the case of the ENARGAS resolution) were calculated, and whether and to what extent these figures reflect environmental or biodiversity-related damage.
- 105/ The overview is based on an overview provided in the Millennium Ecosystem Assessment (2003). MEP and EFTEC (2001), *op cit.*, Annex I, provides a similar overview.
- 106/ Decision VII/25 Annex, section A.
- 107/ NOAA (1996), *op cit.*, annex I.
- 108/ *Ibid*, Annex I, paragraph 1.2.3.
- 109/ Submission of Canada to the Executive Secretary.
- 110/ *British Colombia v. Canadian Forest Products Ltd.*, [2004] 2 S.C.R. 74.
- 111/ United Nations Compensation Commission Governing Council, *Report and Recommendations made by the Panel of Commissioners Concerning the Fifth Installment of "F4" Claims*, doc. S/AC.26/2005/10 (30 June 2005). "F4" claims are claims for damage to the environment.
- 112/ *Ibid*, sub-section II E 7, paragraphs 72 to 82.
- 113/ See SCBD (2007), *op cit.*, p.16, referring to Millennium Ecosystem Assessment (2003): *Ecosystems and Human Well Being: A Framework for Assessment*. Island Press, Washington D.C., p.133.
- 114/ See case XIII in SCBD (2007) *op cit.*
- 115/ See Arrow K. Solow R. Portney P. Leamer E. Radner R. Shuman H. (1993): *Report of the NOAA Panel on Contingent Valuation*. Resources for the Future, Washington D.C. See SCBD (2007), p.19, for a brief summary of the guidance provided by the Panel.
- 116/ For instance, an important limitation in terms of applying these methods to biodiversity and associated ecosystem services is that respondents cannot typically make informed choices if they have a limited understanding of the issue in question. Choosing the right approach for, and the adequate intensity of efforts in, improving the understanding of biological complexity of the sample group is a challenge for stated preference methods.
- 117/ For instance, a contingent valuation study can well be integrated with and extended into a public participation exercise. Deliberative and participatory approaches, by disseminating pertinent knowledge, may play an important role in broadening the understanding on the issue of the relevant stakeholders. See studies IV and IX in SCBD (2007) as examples for the use of participatory and deliberative approaches within economic valuation.
- 118/ See for details De Groot *et al* (2006): *Valuing Wetlands. Guidance for Valuing the Benefits Derived from Wetland Ecosystem Services*. Ramsar Technical Report Number 3; CBD Technical Series 27.
- 119/ Decision VIII/25 annex, paragraph 5.
- 120/ See for further discussion SCBD (2007), pp.20-22, and references therein.
- 121/ For instance, in the context of the introduction of the European Liability Directive, the government of Scotland used benefits transfer to assess the benefits of additional remediation measures that may be required under the Directive. See The Scottish Government (2006): *European Liability Directive – a Consultation*. Annex II, paragraph 86. Available under <http://www.scotland.gov.uk/Publications/2007/01/04155835/21>.
- 122/ Decision VIII/25 annex, section A.
- 123/ MEP and EFTEC (2001), *op cit.*, annex A, pp.29-30.