SUBMISSION FROM THE PUBLIC RESEARCH AND REGULATION INITIATIVE (ORGANIZATION)

FORM FOR THE SCIENTIFIC REVIEW OF THE GUIDANCE ON RISK ASSESSMENT OF LIVING MODIFIED ORGANISMS

The Guidance for Risk Assessment of Living Modified Organisms (the "Guidance") was developed through collaborative efforts between the Open-ended Online Expert Forum and the Ad Hoc Technical Expert Group (AHTEG) on Risk Assessment and Risk Management.*

The aim of the Guidance is to further elaborate the methodology for risk assessment of living modified organisms (LMOs) in accordance with the Cartagena Protocol on Biosafety, and in particular in accordance with Annex III of the Protocol.

The Guidance is intended to be a "living document" that will be improved with time as new experience becomes available and new developments occur in the field of applications of LMOs, as and when mandated by the Parties to the Cartagena Protocol on Biosafety.

At the fifth meeting of the Conference of the Parties serving as the meeting of the Parties to the Protocol (COP-MOP), the Parties to the Protocol welcomed the first version of the Guidance and noted that it requires further scientific review and testing to establish its overall utility and applicability to living modified organisms of different taxa introduced into various environments.

The Executive Secretary was therefore requested to coordinate a review process of this first version of the Guidance among Parties and other Governments, through their technical and scientific experts, and relevant organizations.

The following questions are aimed at seeking views to assist the Open-ended Online Expert Forum and the AHTEG in revising the Guidance.

The completed review forms are to be mailed to the Secretariat at: riskassessment.forum@cbd.int . Reviews from Parties and other Governments are to be submitted by their National Focal Points. Reviews from organizations are to be submitted through their head offices.

* Additional information on the development of the "Guidance on Risk Assessment of Living Modified Organisms" may be found in document UNEP/CBD/BS/COP-MOP/5/12 (see "Official Documents" at http://www.cbd.int/doc/?meeting=MOP-05).

i. Reviewer's information

*Please select **only one** of options below*

This scientific review of the Guidance on Risk Assessment of Living Modified Organisms is being submitted on behalf of a:

☐ Party. Please specify: <Country's name>

☐ Other Government. Please specify: <Country's name>

☒ Organization: Please specify: Public Research and Regulation Initiative

ii. Overall evaluation

*Please select **only one** answer for each section*

Q1. How do you evaluate the level of consistency of the following sections of the Guidance with the Cartagena Protocol on Biosafety, particularly with its Article 15 and Annex III?

	Very poor	Poor	Neutral	Good	Very good
• Roadmap for risk assessment	☐	☐	☒	☐	☐
• Risk assessment of living modified organisms with stacked genes or traits	☐	☒	☐	☐	☐
• Risk assessment of living modified crops with tolerance to abiotic stress	☒	☐	☐	☐	☐
• Risk assessment of living modified mosquitoes	☒	☐	☐	☐	☐

Q2. How do you evaluate the usefulness of the following sections of the Guidance as tools for assisting countries in conducting and reviewing risk assessments of LMOs in a scientifically sound and case-by-case manner?

	Very poor	Poor	Neutral	Good	Very good
• Roadmap for risk assessment	☐	☐	☒	☐	☐
• Risk assessment of living modified organisms with stacked genes or traits	☐	☒	☐	☐	☐
• Risk assessment of living modified crops with tolerance to abiotic stress	☒	☐	☐	☐	☐
• Risk assessment of living modified mosquitoes	☒	☐	☐	☐	☐

Q3. How do you evaluate the usefulness of the following sections of the Guidance as tools for assisting countries in conducting and reviewing risk assessments of LMOs introduced into various receiving environments?

	Very poor	Poor	Neutral	Good	Very good
• Roadmap for risk assessment	☐	☐	☒	☐	☐
• Risk assessment of living modified organisms with stacked genes or traits	☐	☒	☐	☐	☐
• Risk assessment of living modified crops with tolerance to abiotic stress	☒	☐	☐	☐	☐
• Risk assessment of living modified mosquitoes	☒	☐	☐	☐	☐

Q4. How do you evaluate the usefulness of the "Roadmap" as a tool for assisting countries in conducting and reviewing risk assessments of LMOs of different taxa?

	Very poor	Poor	Neutral	Good	Very good
• Roadmap for risk assessment	☐	☒	☐	☐	☐

ADDITIONAL COMMENTS ON THE OVERALL EVALUATION

Please add any additional comment you may have regarding the overall evaluation of the first version of the "Guidance on Risk Assessment of Living Modified Organisms" below.

Q5. *PRRI still finds the document to be insufficiently grounded in Annex III. While it does a good job of clarifying the steps in risk assessment, and introduces the concepts of problem formulation, the details and points to consider included in each of these steps add unnecessary complexities to the risk assessment that do not contribute to a better risk assessment, nor assist an inexperienced risk assessor in applying the points to consider in Annex III. PRRI also observes that the discussion of points to consider within the framework of this roadmap still leaves a void in the understanding of a risk assessor, especially one who has little experience: a clear rationale for the inclusion of specific points to consider in the risk assessment steps is lacking throughout the document. Adding this rationale, (separate from the rationale for the risk assessment step) would help a risk assessor understand the relevance of each point to consider for the specific LMO being assessed.*

iii. Section-by-section review

*Please select **only one** of the boxes for each question*

PART I: THE ROADMAP FOR RISK ASSESSMENT

1. INTRODUCTION

Q6. Are all the concepts in this section relevant and accurate from a scientific point of view?

☐ Yes

☒ No. Please comment: <Type here>

Q7. Does this section include all the necessary relevant concepts?	☐ Yes ☒ No. Please comment: Additional clarification on some of the concepts is needed. 1. Page 2, paragraph 3: The choice of protection goals is not up to the risk assessor to determine at the beginning of each risk assessment. Instead, protection goals as defined by existing policy or agreements are the same for all risk assessments, and the adverse effects relevant to the Protocol should be related to those protection goals. Not all potentially different characteristics are adverse, and not all adverse effects are within the scope of the Protocol. Reference to Articles 7(a), 7(b), 8(g) of the Convention on Biodiversity do not help in identifying protection goals. Articles 7(a) and 7(b) direct parties to identify components of biodiversity important to its conservation and sustainable use, but does not identify them. Article 8(g) directs parties to establish means to regulate, manage or control LMOs. Perhaps clarification should be provided here to remind parties that for proper risk assessment, a clear statement of protection goals, which would come out of the adherence to these provision of the Convention, would provide clarity and focus to the risk assessment process. Appendix I of the convention could be helpful in that it identifies entities that could be considered worth protecting and therefore the risk assessment should focus on the potential for adverse effects of an LMO on those specific entities. In this regard, more clear explanations of the newly introduced concepts such as protection goals, assessment endpoints, etc. should be provided. 2. Page 3, Overarching Issues, first bullet point: This point provides an opportunity to further add structure to the risk assessment process by guiding risk assessors to include criteria for limiting data requirements to those that are pertinent to the country's protection goals. This will prevent risk assessors from requesting data that are irrelevant to risk assessment. 3. Page 4, second sub-bullet (second paragraph): Accessibility of the data is indeed necessary for proper risk assessment, but in the context of this document, it should be clarified that this means that data are provided to the risk assessors, and not to any interested party. This assures maintenance of confidential business information but more importantly, it assures that risk assessors can make their decisions without interference from parties who might seek to influence their decision. 4. Page 4, third paragraph if the bullet point on identification and consideration of uncertainty: It should be made clear that it is not necessary to eliminate all uncertainty before a decision can be taken. In all risk assessments, uncertainty is unavoidable; decisions may be taken with a reasonable level of uncertainty. Finally, it should also be made clear that additional information does not necessarily remove uncertainty, and any request for further information should be made with the understanding of how that information will reduce uncertainty.
Q8. Are all the concepts in this section expressed in a language that could be easily understood by the target users?	☒ Yes ☐ No. Please comment: <Type here>

2. THE RISK ASSESSMENT

Step 1: "An identification of any novel genotypic and phenotypic characteristics associated with the living modified organism that may have adverse effects on biological diversity in the likely potential receiving environment, taking also into account risks to human health"

Q9. Are all the concepts in this section relevant and accurate from a scientific point of view?

☐ Yes

☒ No. Please comment:

1. General comment on the Points to Consider section: This comment applies not only to the points to consider in this section but in those that follow. This roadmap would be a more useful guide if the points to consider that are the same as those contained in Paragraph 9 of Annex III of the Protocol were to be stated in the same words. Or alternatively, those points could simply be referred to as for example, "point x of Paragraph 9". It would only be necessary to state points that are in addition to those listed in Paragraph 9. This policy will reduce confusion and allow further determination whether the "new" points really are new.

2. Point to consider (a): subpoints (iii) and (v) are really components of a single issue and should be combined.

3. Point to consider (c): as mentioned in the response to Q5 of the Overall Evaluation, it would be helpful to include a rationale for the need to consider molecular data in this part of the risk assessment. There is some attempt to provide a rationale for considering expression levels or "combinatorial effects". However, in mentioning the latter, the definition in the footnote remains highly hypothetical To be more helpful, a real-life example of what is meant should be provided.

4. Point to consider (d): This point really encompasses the idea of "combinatorial effects", and therefore renders the concept from the previous point redundant. The mention of those effects could therefore be deleted entirely from (c), or moved into section (d).

5. Points to consider (h) and (i) are part of the same issue and should therefore be combined.

6. Point to consider (k): Given the definition of cumulative effects given in the footnote, this point is unnecessary. In risk assessment one does not consider the risk only of a single LMO, but rather the risk on the environment of multiple LMO's.

7. Point to consider (m): PRRI questions the specific mention of HGT, since it was not included in Annex III points to consider. However, if this point is to be added, for the sake of symmetry, in the section on likelihood (step 2) consideration of the likelihood of HGT should also be mentioned. References on the failure to detect this phenomenon from transgenic plants or transgenic plant material to other organisms should be added to the reference list, including the following:

Broer et al, 1996. Examination of the putative horizontal gene transfer from transgenic plants to Agrobacteria. In: Transgenic organisms and biosafety, horizontal gene transfer, stability of DNA and expression of transgenes. E.R. Schmidt and T. Hankeln, eds.. Heidelber, Springer Verlag, pp. 67-70.

Schluter et al, 1995. "Horizontal" gene transfer from a transgenic potato line to a bacterial pathogen (Erwinia

	chrysanthemi) occurs--if at all--at an extremely low frequency. Bio/technology 13: 1094-1098. Paget et al, 1998. The fate of recombinant plant DNA in soil. European Journal of Soil Biology 23: 81-88. Gebhard and Smalla, 1999. Monitoring field releases of genetically modified sugar beets for persistence of transgenic plant DNA and horizontal gene transfer. FEMS Microbiology Ecology 28: 261-272 Bertolla et al, 2000. Plant genome complexity may be a factor limiting in situ the transfer of transgenic plant genes to the phytopathogen Ralstonia solanacearum. Applied Environmental Microbiology 66: 4161-4167. Lynch et al, 2003: Microbial diversity in soil: ecological the contribution of molecular techniques and the impact of transgenic plants and transgenic microorganisms. Biology and Fertility of Soils 40: 363-385. PRRI also recommends that the section currently containing references on horizontal gene transfer should simply be labeled "Horizontal gene transfer", since the references listed thereunder are not primarily concerned with adverse effects due to this phenomenon.
Q10. Does this section include all the necessary relevant concepts?	☒ Yes ☐ No. Please comment: <Type here>
Q11. Are all the concepts in this section expressed in a language that could be easily understood by the target users?	☒ Yes ☐ No. Please comment: <Type here>
Step 2: "An evaluation of the likelihood of adverse effects being realized, taking into account the level and kind of exposure of the likely potential receiving environment to the living modified organism"	
Q12. Are all the concepts in this section relevant and accurate from a scientific point of view?	☐ Yes ☒ No. Please comment: 1. Page 8, third paragraph of the rationale: The word "likelihood" should be substituted for "potential" , to be consistent with the language and meaning of Step 2. 2. Point to consider (d): Since horizontal gene transfer is mentioned in the points to consider in Step 1, then likelihood of that HGT should also be considered here, including results from the existing literature regarding HGT from specific LMO's. in particular, studies that have failed to detect HGT from transgenic plants in the field are relevant to this point, since they show the failure to detect these events under real-world conditions (see references listed above). 3. Point to consider (e): In the case of confined field trials, exposure should be assessed in light of the management conditions imposed. In fact, in the case of confined field trials, Step 2 should be considered before Step 1, since the low exposure to the environment (both in time and space), reduce the risk to acceptable levels without considering all the potential adverse effects. The order in which one proceeds through the steps in the roadmap is therefore affected by the nature of the

	proposed activity (confined field trial or commercial release). Furthermore, if this step results in the judgment that risk is acceptable because of confinement measures, the assessment may stop at this point, without need for consideration of adverse effects. This principle is applicable throughout the risk assessment process. At any point, the assessment may stop whenever risk assessors decide that further information is not necessary to arrive at a decision.
Q13. Does this section include all the necessary relevant concepts?	☒ Yes ☐ No. Please comment: <Type here>
Q14. Are all the concepts in this section expressed in a language that could be easily understood by the target users?	☒ Yes ☐ No. Please comment: <Type here>
Step 3: "An evaluation of the consequences should these adverse effects be realized"	
Q15. Are all the concepts in this section relevant and accurate from a scientific point of view?	☐ Yes ☒ No. Please comment: 1. Point to consider (b): This point is simply a restatement of step 1, is out of place, and should therefore be deleted. 2. Point to consider (d): A similar point should be included about HGT as well. Since it is specifically identified in Step 1, it should similarly be dealt with in Steps 2 and 3. However, PRRI questions whether it should be singled out as a specific area of concern, meriting particular attention. This is particularly inadvisable given the lack of evidence for the occurrence of this phenomenon from transgenic plants.
Q16. Does this section include all the necessary relevant concepts?	☒ Yes ☐ No. Please comment: <Type here>
Q17. Are all the concepts in this section expressed in a language that could be easily understood by the target users?	☒ Yes ☐ No. Please comment: <Type here>

Step 4: "An estimation of the overall risk posed by the living modified organism based on the evaluation of the likelihood and consequences of the identified adverse effects being realized"	
Q18. Are all the concepts in this section relevant and accurate from a scientific point of view?	☒ Yes ☐ No. Please comment: <Type here>
Q19. Does this section include all the necessary relevant concepts?	☒ Yes ☐ No. Please comment: <Type here>
Q20. Are all the concepts in this section expressed in a language that could be easily understood by the target users?	☒ Yes ☐ No. Please comment: <Type here>
Step 5: "A recommendation as to whether or not the risks are acceptable or manageable, including, where necessary, identification of strategies to manage these risks"	
Q21. Are all the concepts in this section relevant and accurate from a scientific point of view?	☐ Yes ☒ No. Please comment: Point (c) in the section on Points to consider related to the acceptability of risks: Prior to considering the feasibility of risk management or monitoring, the necessity for such measures should be first considered. If the risks are acceptable, then no management or monitoring is necessary. Furthermore, the concept of monitoring in this roadmap is not clearly developed. The type of monitoring should also be considered, and this will then incorporate the idea of feasibility. For example, for most countries, the type of monitoring that would make sense scientifically and from the standpoint of feasibility would be hypothesis-driven rather than general monitoring. However, the different types of monitoring are not distinguished in this mention of the subject. Rather than being helpful, the mention of monitoring here further adds to questions that a risk assessor will need to have resolved.
Q22. Does this section include all the necessary relevant concepts?	☒ Yes ☐ No. Please comment: <Type here>
Q23. Are all the concepts in this section expressed in a language that could be easily understood by the target users?	☒ Yes ☐ No. Please comment: <Type here>
3. RELATED ISSUES	
Q24. Does the "Related Issues" section include all relevant issues related to risk assessment and decision-making process but that are outside the scope of the Roadmap?	☐ Yes ☒ No. Please comment: The statement "Some members of the AHTEG considered some issues to be related to risk assessment and decision- making process …" may be confusing to some, especially in light of the list of topics. It should be explained that risk assessment is an input into the decsion-making process. Therefore, attempts to include other issues in a roadmap are inappropriate and therefore out of scope.

4. FLOWCHART

Q25. Does the flowchart provide an accurate graphic representation of the risk assessment process as described in the Roadmap?	☐ Yes ☒ No. Please comment: The flowchart does not adequately describe the different approach that should be taken with respect to confined field trials, where the primary focus is on management efforts that limit exposure. Therefore, Step 2 is really the more relevant step for confined field trials and should therefore be considered first. It would be helpful to include the consideration of the purpose of the application (confined field trial or commercial release) in the flowchart as part of the context and scoping.

PART II: SPECIFIC TYPES OF LMOs AND TRAITS	
A. RISK ASSESSMENT OF LIVING MODIFIED ORGANISMS WITH STACKED GENES OR TRAITS	
Q26. Are all the concepts in this section relevant and accurate from a scientific point of view?	☐ Yes ☒ No. Please comment: 1. Paragraph 1 of the rationale for assessment of potential interactions…: This paragraph should acknowledge that countries vary in their view regarding the necessity to conduct a separate risk assessment for stacked events. This guidance should not imply that parties assess stacked events to be compliant with the Protocol. 2. Paragraph 2, points (a) and (b) of the rationale for assessment of combinatorial and cumulative effects…: Points (a) and (b) are the two areas that Codex Alimentarius identifies as the primary sources of information regarding food safety, and in the context of environmental risk assessment, reliance on these sources is also valid. It is this information that would properly identify potential new or increased adverse effects. Conducting risk assessments by starting with hypothetical or speculative combinatorial and cumulative effects that might have to be examined one by one will lead to endless rounds of data gathering on possible effects that would have no significant final impact (e.g. could be cancelled out by other combinatorial or cumulative effects). Phenotypic characteristics and/or compositional analysis integrates these multiple and interacting combinatorial and cumulative effects.
Q27. Does this section include all the necessary relevant concepts?	☒ Yes ☐ No. Please comment: <Type here>
Q28. Are all the concepts in this section expressed in a language that could be easily understood by the target users?	☒ Yes ☐ No. Please comment: <Type here>
B. RISK ASSESSMENT OF LIVING MODIFIED CROPS WITH TOLERANCE TO ABIOTIC STRESS	
Q29. Are all the concepts in this section relevant and accurate from a scientific point of view?	☐ Yes ☒ No. Please comment: Bullet points in the Risk Assessment section: These bullet points would be considered as part of the problem formulation phase of the risk assessment of any trait. Therefore, there is no need to repeat them here separately for abiotic stress tolerance, and illustrates the point that this guidance on abiotic stress superfluous and should be deleted.
Q30. Does this section include all the necessary relevant concepts?	☒ Yes ☐ No. Please comment: <Type here>

Q31. Are all the concepts in this section expressed in a language that could be easily understood by the target users?	☒ Yes ☐ No. Please comment: <Type here>
C. RISK ASSESSMENT OF LIVING MODIFIED MOSQUITOES	
Q32. Are all the concepts in this section relevant and accurate from a scientific point of view?	☒ Yes ☐ No. Please comment: <Type here>
Q33. Does this section include all the necessary relevant concepts?	☐ Yes ☒ No. Please comment: In the case of LM mosquitoes, there is again the need to consider the steps in risk assessment in the case of a confined field trial. As this guidance document points out, some strategies for deployment involve the incorporation of sterility mechanisms that genetically contain transgenes in question. This is the type of LM mosquito currently availble and in testing. LM mosquitos with gene drive systems are not yet available. In the case of LM mosquitoes with sterility mechanisms, the exposure (likelihood) step of the risk assessment should be considered first. Since the sterility mechanisms limit exposure, considering risks of potential adverse effects is not necessary. The case of LM mosquitoes also provide a compelling reason for considering the relative risks not only of the non-modified organism, but also of the current practices to control the non-modified organism. In this case, the widespread use of wide spectrum insecticides, as well as water drainage and landfilling also have a significant adverse effect on the conservation and sustainable use of biodiversity.
Q34. Are all the concepts in this section expressed in a language that could be easily understood by the target users?	☒ Yes ☐ No. Please comment: <Type here>

ADDITIONAL COMMENTS ON THE SECTION-BY-SECTION REVIEW

Please add any additional comment you may have regarding particular sections of the first version of the "Guidance on Risk Assessment of Living Modified Organisms" below.

Q35. <Please type your comments here>