

Submission

Draft Literature Review of Trends and Issues in Synthetic Biology (2012 – 2023)

February 2024

Comments on the literature review of trends and issues in synthetic biology (2012-2023)

(The information below was submitted in response to the [CBD Notification SCBD/CPU/DC/WM/MW/91494](#) on the Draft Literature Review of Trends and Issues in Synthetic Biology (2012–2023), available [here](#).)

Page: General

Line: General

Comment: The Network welcomes the efforts of the CBD Secretariat to provide additional information on issues and trends in synthetic biology. Given the advanced stage of the MATHEG discussions, it would be useful if the CBD Secretariat could clarify how the literature review and the issues it has identified will fit into the ongoing horizon scanning discussions and align with the overall MAHTEG process and its conclusions, and what Parties will be asked to consider at SBSTTA-26 in May 2024.

The literature review could have played a pivotal role in informing discussion about the priority topics for horizon scanning when the process began in 2023. Discussions in the MAHTEG have now progressed significantly, including through online fora and submission calls, through which perspectives on synthetic biology issues and trends were shared twice. The MAHTEG has also convened twice and has devised its own list of priority issues.

The literature review is very useful, yet its key findings are substantially different from the prioritized list of trends and issues currently under MAHTEG's consideration (Table 1). It is unclear how the two different outcomes are to be reconciled into one coherent list of priorities for Parties to consider as an outcome of the horizon scanning, or how the two approaches should be weighted.

Page: 6

Line: Table 1

Comment: There is a significant difference between the issues identified in the literature review and the list of issues that have emerged from the discussions held during the meetings of the MAHTEG members. Comparing the 17 topics shortlisted by the MAHTEG with the top 17 topics identified in the literature review, only four topics are common to both lists. These are: "Transient modification of agricultural plants, pests and pathogens using RNAi or nanomaterials Virus-induced genome editing and genetic modifications", "Synthetic biology applications for bioremediation, biodegradation or biomining", "Integration of artificial intelligence and machine learning" and "Genome edited plants". Topics such as "Engineered gene drives to control vector-borne and invasive species" are not among the top issues from the literature review (it only comes in at #29) and yet are among the issues and trends under MAHTEG's priority list. The majority of the trends and issues (nine) under consideration by the MAHTEG fall beyond the 35th position in the literature review ranking.

These are significant differences and some the issues identified in the literature review are indeed topics that have not been subject to prior discussion under the CBD, whereas others that are at the top of the MAHTEG list, such as gene drive LMOs, have been on the agenda of CBD since 2016. While publication counts may be just one criterion employed in the selection process, with many factors influencing how much is published about a

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given topic, understanding how the two co-existing lists of issues are meant to be considered and how the literature review should impact the prioritisation of issues to be presented to Parties at SBSTTA should be a made clear.

Page: 16

Line: 21-31

Comment: Several factors can affect publication counts, including the methodology applied to quantify citations and how fast scientific studies progress. Therefore, the subset of trends and issues with less than 100 publications from 2012 to 2023 cannot be credited only to “restricted exploitation or recognition” or issues that “only recently gained attention within the scientific community”. For example, engineered gene drives are neither a new issue nor an irrelevant field of research. Naturally occurring gene drive systems (selfish genetic elements) have been identified since the 1880’s and discussions about synthetic gene drives emerged in the 1960’s. Scientists have been investigating the use of the homing endonuclease gene to drive genetic changes in a natural population of mosquitoes for over two decades, with a host of peer-reviewed publications documenting progress in the research since then. If proven safe and effective, gene drive tools could offer significant additions to the existing toolkits in the fight against vector-borne diseases and invasive alien species. While the literature review identified 180 studies on gene drives published between 2012 and 2023, this is not necessarily reflective of the fact that it is an emerging research domain. And indeed, gene drive organisms have been under discussion at CBD for almost a decade, including under previous AHTEGs under both synbio and risk assessment. That this is a well-established field of research is also demonstrated by the fact that several guidance documents exist which provide frameworks for how this research is to be conducted, including from the World Health Organisation (WHO, Guidance framework for testing of genetically modified mosquitoes, second edition, 2021) and the US National Academies of Sciences, Engineering, and Medicine (NASEM, Gene drives on the Horizon, 2016), with more underway (for example the National Gene Drive Policy Guide developed by the Government of Australia).

Page: 17

Line: 36-38

Comment: Synthetic biology has been on the CBD's agenda for many years. During this time frame, the AHTEG discussed new developments in synthetic biology and reported these to SBSTTA several times. Some issues and trends currently under MAHTEG analysis, such as gene drives, have been discussed before. To optimise resource allocation and ensure the process of horizon scanning is helpful, it should focus on novel developments that the previous AHTEGs and SBSTTAs have not yet addressed.

Research progress and scientific breakthroughs can take several years; hence, a permanent horizon scanning may not yield sufficient novel findings to justify an open-ended mandate with horizon scanning repeated every other year. Instead, increased cooperation and information sharing between CBD and many other organisations and bodies conducting work on synthetic biology would be more helpful to ensure Parties have access to relevant information in the field.