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Ad Hoc Technical Expert Group on Synthetic Biology
Montreal, Canada, 19–22 May 2026
Item 5 of the provisional agenda*
Adoption of the report

Report of the Ad Hoc Technical Expert Group on Synthetic Biology

Background

In its decision 16/21, the Conference of the Parties established a new ad hoc technical expert group tasked with, among other things and in relation to the three objectives of the Convention on Biological Diversity and the implementation of the Kunming-Montreal Global Biodiversity Framework: identifying the current and potential benefits of synthetic biology and the potential positive and potential negative impacts of the most recent technological developments in synthetic biology; and, in the light of future developments of synthetic biology, providing advice on ways to take into account capacity-building and development, access to and transfer of technology and knowledge-sharing in synthetic biology with respect to the thematic action plan that the Conference of the Parties decided to develop in the same decision.

The meeting of the Expert Group was attended by 16 experts from Parties, 1 expert from non-Parties, 1 expert from indigenous peoples and local communities, 1 expert from women organizations, 1 expert from youth organizations and 8 experts from observer organizations. Four experts from Parties and 1 expert from an organization were unable to attend the meeting.

In accordance with the Procedure for Avoiding or Managing Conflicts of Interest in Expert Groups, all nominated experts participating in the meeting of the Ad Hoc Technical Expert Group on Synthetic Biology, held from 19 to 22 May 2026, were requested to complete and submit interest disclosure forms prior to their involvement.[a] The 33 experts duly submitted their interest disclosure forms. Six experts declared a potential conflict of interests related to their professional activities, affiliations or intellectual property; one expert declared involvement in funded research and advisory activities related to synthetic biology; one expert disclosed participation in academic research activities related to synthetic biology; one expert indicated that the nominating organization was composed of members from academia and industry and received external funding, which could be perceived as creating an interest in the success of member companies; one expert disclosed an affiliation with an organization advocating for the responsible use of synthetic biology in nature conservation; one expert declared employment by a company developing biotechnology products; and one expert disclosed being an inventor on a granted and active patent related to engineered gene drive technology.

While two additional experts indicated that they held patents or intellectual property related to synthetic biology technologies, they stated that no conflict of interest existed, as the intellectual property related to technical achievements or had not been licensed or purchased.

The Secretariat of the Convention on Biological Diversity reviewed the information provided in accordance with its role under the Procedure and assessed that none of those disclosures presented a barrier to the objective participation in the meeting of the individuals concerned.

[a] See, in that regard, decisions 14/33 and 16/26 of the Conference of the Parties.

* CBD/SYNBIO/AHTEG/2026/1.

Item 1
Opening of the meeting

1. The meeting of the Ad Hoc Technical Expert Group on Synthetic Biology was opened at 9 a.m. on Tuesday, 19 May 2026, by a representative of the Secretariat of the Convention on Biological Diversity. In her opening remarks, the Executive Secretary of the Convention, Astrid Schomaker, welcomed the experts and highlighted the importance of the topic of synthetic biology, indicating that it held much promise but also potential risks. She encouraged the members of the Expert Group to share their technical expertise and learn from one another in order to achieve a better understanding of the challenges and opportunities presented by synthetic biology.

2. The Chair of the Subsidiary Body on Scientific, Technical and Technological Advice delivered opening remarks emphasizing the importance of ensuring that the outcomes of the Expert Group were communicated in a manner that was clear, balanced and policy relevant.

Item 2
Organizational matters

3. Before the meeting proceeded, a representative of the Secretariat presented information on the declared conflicts of interest in line with the Procedure for Avoiding or Managing Conflicts of Interest in Expert Groups as set out in decisions 14/33 and 16/26.

(a) Election of officers

4. The Expert Group elected Weiwen Zhang (China) and Valeria Giovannelli (Italy) as Co-Chairs of the meeting.

5. The Co-Chairs delivered opening remarks and thanked the Expert Group for the trust that it had placed in them. Mr. Zhang expressed his appreciation for the flexibility needed during the discussions and Ms. Giovannelli emphasized the importance of all of the expertise to be found within the membership of the Group and the respectful working environment required in addressing its mandate.

(b) Adoption of the agenda

6. The Expert Group adopted the agenda of the meeting, as contained in document CBD/SYNBIO/AHTEG/2026/1/1.

(c) Organization of work

7. The Expert Group approved the provisional organization of work as contained in document CBD/SYNBIO/AHTEG/2026/1/1/Add.1.

Item 3
Implementation of the mandate

8. The Secretariat provided an overview of the documents made available for the meeting pursuant to decision 16/21.

9. In conducting their deliberations under this agenda item, the members of the Expert Group noted the challenges associated with conducting an analysis of the most recent technological developments in synthetic biology. The challenges were due to a lack of clarity regarding which applications could be considered to constitute examples of synthetic biology in accordance with the operational definition of the term.[1] The Group took note of decision XIII/17 in which the Conference of the Parties took note of the conclusion of the Ad Hoc Technical Expert Group on Synthetic Biology

[1] See decision XIII/17, para. 4. of.

that living organisms developed through current applications of synthetic biology or that were currently in the early stages of research and development were similar to living modified organisms as defined in the Cartagena Protocol on Biosafety.

(a) Capacity-building, technology transfer and knowledge-sharing in the light of future developments in synthetic biology

10. Prior to consideration of this sub-item: a representative of the Institute of Genetics and Cytology of the National Academy of Sciences of Belarus delivered a presentation on the thematic action plan; the Secretariat gave a presentation on the long-term strategic framework for capacity-building and development and shared information regarding the technical and scientific cooperation mechanism; and a representative of the United Nations Environment Programme (UNEP) delivered a presentation on the capacity-building projects funded by the Global Environment Facility.

11. Under this sub-item, the experts were invited to share their perspective on additional elements associated with the implementation of the thematic action plan in the context of synthetic biology.

12. The experts emphasized that the approach taken with respect to future developments in synthetic biology should be flexible and forward-looking in nature. Parties should be able to benefit from horizon scanning and monitoring in order to identify realistic applications and emerging developments, while applying a precautionary approach. The conclusions arising from the deliberations of the Expert Group are contained in annex I to the present document.

13. The experts noted that it would be important to consider certain substantive elements in the context of the thematic action plan, while recognizing that any proposed revisions of the content fell outside their mandate as set out in decision 16/21. In particular, the experts highlighted the importance of ensuring that the thematic action plan remained responsive to broader cross-cutting issues, including biosecurity and biosafety concerns, regulatory frameworks, liability and redress, equity considerations, environmental and social safeguards, public sector research, technology transfer and data sovereignty.

(b) Review and synthesis of information on synthetic biology

14. Under this sub-item, the experts considered information in documents CBD/SYNBIO/AHTEG/2026/1/2, CBD/SYNBIO/AHTEG/2026/1/INF/1, CBD/SYNBIO/AHTEG/2026/1/INF/2 and CBD/SYNBIO/AHTEG/2026/1/INF/3 that was gathered during the intersessional period and provided their reflections.

15. A statement related to concerns about potential conflicts of interest with respect to the organizations that had conducted the independent scientific study on synthetic biology[2] and the implications for the quality of the study was provided in a letter from the Third World Network on behalf of eight civil society organizations. The Secretariat shared the letter with the members of the Expert Group.

16. A presentation was delivered by the authors of the independent study.

17. The experts expressed concerns related to the information and data emerging from the independent study and concluded that the study lacked sufficient scientific rigour and the comprehensive information base needed to inform their deliberations.

18. Specific concerns were raised with respect to: the overall methodology, including the selection of search terms used in the systematic review, which was considered to have influenced the outcomes of the study; the exclusion of journal articles on the basis of the impact factor; the sample size used for data collection in the survey and, in particular, the limited number of respondents and the degree

[2] CBD/SYNBIO/AHTEG/2026/1/INF/3.

of their representativeness; and the methodology applied to assess the potential contributions of synthetic biology to specific targets of the Kunming-Montreal Global Biodiversity Framework.

19. The experts expressed the view that, notwithstanding the methodological limitations identified, some findings from the literature review of the independent study were consistent with previous trends identified during previous intersessional periods, including in the 2022 publication entitled *Synthetic Biology* (No. 100 in the Convention on Biological Diversity Technical Series),[3] the work of other ad hoc technical expert groups[4] and the literature review prepared previously by the Secretariat.[5]

20. The experts emphasized the importance of ensuring that future studies drew upon multidisciplinary and diverse knowledge systems and sources, including the knowledge and perspectives of indigenous peoples and local communities as well as those of women and youth, in order to effectively support evidence-based deliberations under the Convention. The experts also emphasized the importance of ensuring adequate time and resources for the preparation and peer review process of any future studies in order to ensure the achievement of a high level of scientific quality.

21. The meeting considered the information gathered in documents CBD/SYNBIO/AHTEG/2026/1/2, CBD/SYNBIO/AHTEG/2026/1/INF/1 and CBD/SYNBIO/AHTEG/2026/1/INF/2, and the experts provided general comments on that information. As mentioned above, the outcomes of their deliberations are contained in annex I.

22. In building upon previous work undertaken under the Convention and its Protocols, the Expert Group observed certain similar trends in synthetic biology as reflected in those documents.

23. The Expert Group took note of other developments and activities, including the adoption by the International Union for Conservation of Nature of a policy on synthetic biology in relation to nature conservation[6] and the ongoing work of the Biological Weapons Convention Working Group on the Strengthening of the Convention.[7]

(c) Current and potential benefits of synthetic biology

24. The experts considered the information on current and potential benefits of synthetic biology contained in documents CBD/SYNBIO/AHTEG/2026/1/2, CBD/SYNBIO/AHTEG/2026/1/INF/1 and CBD/SYNBIO/AHTEG/2026/1/INF/2. Following an initial round of discussions, the members discussed and provided input on the current and potential benefits of synthetic biology in two regionally balanced breakout groups.

25. The experts considered the provisional list of the current benefits of synthetic biology contained in document CBD/SYNBIO/AHTEG/2026/1/2, as well as additional examples shared during the tour de table. The outcomes of the deliberations are detailed in annex II below. In concluding their deliberations, the experts noted that the identification of current benefits was not based on the results of an assessment and that there were different perspectives on what could be considered a current benefit. It was noted, however, that information related to contributions to the Framework might be considered in determining eligibility for the status of benefit.

26. With regard to the potential benefits of synthetic biology, the experts reviewed the tables contained in documents CBD/SYNBIO/AHTEG/2026/1/2, CBD/SYNBIO/AHTEG/2026/1/INF/1 and CBD/SYNBIO/AHTEG/2026/1/INF/2. The Expert Group tried to align potential contributions

[3] Available at www.cbd.int/doc/publications/cbd-ts-100-en.pdf.
[4] See UNEP/CBD/SYNBIO/AHTEG/2015/1/3, CBD/SYNBIO/AHTEG/2017/1/3, CBD/SYNBIO/AHTEG/2019/1/3 and CBD/SYNBIO/AHTEG/2024/1/3.
[5] CBD/SBSTTA/26/INF/5.
[6] See resolution 8.086 of the International Union for Conservation of Nature World Conservation Congress on the policy on synthetic biology in relation to nature conservation.
[7] See BWC/WG/8/CRP.1/Rev.1 (7 February 2026).

of synthetic biology to each target of the Framework. In that regard, there were different perspectives on how potential benefits related to those targets and the potential benefits, as aligned, were therefore not based on an assessment. The outcomes of the deliberations are outlined in annex III below.

(d) Most recent technological developments in synthetic biology

27. The experts, having considered that the overview of the most recent technological developments in synthetic biology and their potential impacts in relation to the Framework, as provided in annex II to document CBD/SYNBIO/AHTEG/2026/1/2, was sufficiently comprehensive, accepted that overview as a basis for further work.

28. The Expert Group took note of the potential positive and potential negative impacts identified in documents CBD/SYNBIO/AHTEG/2026/1/2, CBD/SYNBIO/AHTEG/2026/1/INF/1 and CBD/SYNBIO/AHTEG/2026/1/INF/2. The experts acknowledged the diverse ways in which the most recent technological developments in synthetic biology could produce potential positive and potential negative impacts in relation to the three objectives of the Convention on Biological Diversity and on the implementation of the Framework.

29. From among the 12 areas of the most recent technological developments in synthetic biology outlined in annex II to document CBD/SYNBIO/AHTEG/2026/1/2, the members of the Expert Group identified the following priority areas:

(a) Artificial intelligence and computational biology;

(b) Bioremediation and waste reduction applications;

(c) Artificial cells, synthetic genomics and artificial biochemical pathways;

(d) Applications for conservation use;

(e) Microbiome engineering.

30. The Expert Group considered the area of artificial intelligence and computational biology and compiled reflections on potential positive and potential negative impacts. The information in annex IV below reflects the consideration of that area. Owing to time constraints, the Expert Group was unable to address the remaining four priority areas of the most recent technological developments in synthetic biology.

Item 4
Other matters

31. The Expert Group recognized that 22 May was the International Day for Biological Diversity and marked the occasion with video statements by the Executive Secretary of the Convention and the Executive Director of UNEP. Brief statements were delivered by experts from Armenia and Nigeria and the expert from Argentina on behalf of the expert from the International Indigenous Forum on Biodiversity.

Item 5
Adoption of the report

32. The Co-Chairs introduced the draft report of the meeting, which was adopted, as orally amended.

Item 6
Closure of the meeting

33. Following the customary exchange of courtesies, the meeting was closed at 9.45 p.m. on Friday, 22 May 2026.

Annex I
Conclusions of the Ad Hoc Technical Expert Group on Synthetic Biology

1. The Subsidiary Bodies may wish to consider the following conclusions from the Ad Hoc Technical Expert Group on Synthetic Biology, with a view to submitting a draft decision for consideration by the Conference of the Parties at its seventeenth meeting:

(a) Recognizing the complexity of the most recent technological advances in synthetic biology, a process to assess the most recent technological developments and their potential positive and potential negative impacts, based on the available multidisciplinary scientific evidence and bearing in mind decisions XII/24, XIII/17, 14/19, 15/31 and 16/21 of the Conference of the Parties, may be considered;

(b) The identification and assessment of potential positive and potential negative impacts of the most recent technological developments in synthetic biology should be carried out in an inclusive and balanced manner and build on previous relevant work undertaken under the Convention and its Protocols;

(c) Potential positive and potential negative impacts should be assessed on a multidisciplinary science-based, inclusive and case-by-case basis to contribute to participatory decision-making in accordance with the precautionary approach and national priorities and circumstances and in consultation with indigenous peoples and local communities, women and youth with their free, prior and informed consent;

(d) Noting the potential of synthetic biology to exert positive and negative impacts in the context of the three objectives of the Convention on Biological Diversity and the Kunming-Montreal Global Biodiversity Framework, efforts to support capacity-building and development, access to and transfer of technology and knowledge-sharing in the context of synthetic biology, in line with the Thematic action plan, should be accelerated to address, in particular, development, assessment, governance, regulation and unequal participation in the field of synthetic biology;

(e) Recognition of the importance of anticipatory approaches, including horizon scanning and monitoring mechanisms, in supporting the timely identification and assessment of potential positive and potential negative impacts of future developments in synthetic biology and their potential implications for biodiversity should build on previous relevant work undertaken under the Convention and its Protocols.[1]

[1] Including the publication entitled *Synthetic Biology* (No. 100 in the Convention on Biological Diversity Technical Series) and document CBD/SYNBIO/AHTEG/2024/1/3.

Annex II
Current benefits of synthetic biology in relation to the targets of the Kunming-Montreal Global Biodiversity Framework

1. The Ad Hoc Technical Expert Group on Synthetic Biology identified the current benefits of synthetic biology[1] in relation to the implementation of the Kunming-Montreal Global Biodiversity Framework. Illustrative examples of those benefits are provided in the table below.

2. The following considerations are relevant with respect to the information presented in the table:

(a) There is a lack of clear mechanisms or agreed methodology for identifying or quantifying benefits associated with applications of synthetic biology in the context of the Framework;

(b) Commercialization or large-scale deployment should not be considered a prerequisite for identifying benefits, particularly in the context of biodiversity conservation-related activities;

(c) Some current benefits may be related to broader enabling contributions or tools of synthetic biology;

(d) As various sources were drawn on to produce the examples in the table, including documents CBD/SYNBIO/AHTEG/2026/1/INF/1 and CBD/SYNBIO/AHTEG/2026/1/INF/2 and available expertise, the result does not represent an assessment and should therefore be considered initial and illustrative.

Current benefits of synthetic biology in relation to the targets of the Kunming-Montreal Global Biodiversity Framework

Example	*Targets of the Framework*	*Current benefit(s)*
• Recombinant factor C (a synthetic replacement for limulus amoebocyte lysate sourced from horseshoe crabs) • Semi-synthetic artemisinin (an antimalarial compound sourced from Asian sweet wormwood (*Artemisia annua*)	5 and 9	Reduced harvesting pressure on biodiversity
• Microbes engineered to produce ethanol from industrial emissions through a gas fermentation process	8 and 9	Carbon dioxide emissions reduction
• Cultured meat products (animal muscle tissue generated directly from cultured animal cells)	9	Reduced greenhouse gas emissions Land-use reduction Water use reduction
• Genome edited plants (for example, poplar trees designed to enhance carbon sequestration and accelerated biomass accumulation; and transgenic American chestnut trees with resistance to chestnut blight)	2, 4, 8 and 10	Carbon sequestration Reforestation Sustainable agroforestry
• Underlying tools of synthetic biology (for example, stewardship of enzyme expression plasmids, use of synthetic genomics and advancements in genome editing for xenotransplantation) • International genetically engineered machine competition	20, 21 and 22	Improved scientific infrastructure to support research and development Improved regulation of synthetic biology Improved scientific and technical cooperation in the context of synthetic biology

[1] While acknowledging the variety of perspectives on the operational definition of "synthetic biology" provided indecision XIII/17.

Annex III
Potential benefits of synthetic biology in relation to the targets of the Kunming-Montreal Global Biodiversity Framework

1. The Ad Hoc Technical Expert Group on Synthetic Biology identified the potential benefits of synthetic biology[1] in relation to the implementation of the Kunming-Montreal Global Biodiversity Framework. The potential benefits of synthetic biology have been organized in relation to the relevant targets of the Framework and presented in the table below. As various sources were drawn on to produce the examples in the table, including documents CBD/SYNBIO/AHTEG/2026/1/INF/1 and CBD/SYNBIO/AHTEG/2026/1/INF/2 and available expertise, the result does not represent an assessment and the links to the targets of the Framework may require further verification and consideration.

2. Potential benefits are presented in the table as contextualized uses and are accompanied by illustrative examples. In that regard, some applications of synthetic biology could, depending on their use, be considered to address more than one target. Further, to capture the breadth of potential benefits, some applications appear more than once in the table.

3. Since the illustrative examples of applications are at various stages of conceptualization, research and development, links to indicators in the monitoring framework for the Kunming-Montreal Global Biodiversity Framework have yet to be established.

4. Consideration of the potential benefits of synthetic biology in relation to the Framework resulted in the identification of the following overarching elements:

(a) The potential benefits are context-specific, depending on the application, intended use, likely receiving environment (for example, level of containment), governance (for example, use of risk assessments and readiness of regulatory frameworks) and social environment;

(b) The potential benefits may be unequally distributed;

(c) There is a need to ensure that specific considerations related to indigenous peoples and local communities, women and youth are taken into account.

5. The supporting tools and technologies utilized in synthetic biology could be considered to be cross-cutting in nature and could therefore potentially support contributions to various targets. Those tools include:

(a) Molecular tools (for example, environmental DNA, sequencing and biosensors), which could support an improved understanding of biodiversity and the monitoring of ecosystems and interventions for the conservation and sustainable use of biodiversity;

(b) Biobanking, which could support the preservation and maintenance of genetic diversity of wild and domesticated species.

Potential benefits of synthetic biology in relation to the targets of the Kunming-Montreal Global Biodiversity Framework

Target of the Framework	*Contextualized use(s) (with illustrative examples)*
Target 1	• Management of ecosystem and land use through deployment of engineered organisms to reduce pressure and protect biodiversity, especially of protected lands (for example, engineered crops for increased compactness or yield; and engineering of phytobiomes for water retention and reduced water use)

[1] While acknowledging the variety of perspectives on the operational definition of "synthetic biology" provided in decision XIII/17.

Target of the Framework	*Contextualized use(s) (with illustrative examples)*
Target 2	• Remediation of degraded ecosystems (for example, engineered microbes to degrade hydrocarbons following an oil spill or soil pollutants) • Restoration of degraded ecosystems (for example, engineered bacteria for release of hygroscopic materials in arid environments; modified corals; and diagnostic kits to respond to bleaching events)
Target 4	• Engineered resistance to pathogens in native species (for example, targeted genetic intervention in threatened frogs; and self-spreading vaccines to address wildlife disease) • Increase in genetic diversity of endangered species (for example, cloning of black-footed ferrets and Przewalski's horse from cryopreserved cells; and genome editing to engineer genetic diversity) • Reduction of extractive pressure on wild populations (for example, engineered bacteria or yeast to produce high-value chemicals)
Target 5	• Replacement of natural products sourced from wild populations to reduce or prevent overexploitation (for example, bacteria engineered to produce vanillin, vetiver or squalene; and synthetic rhinoceros horn)
Target 6	• Elimination, reduction or control of invasive alien species to reduce harmful environmental impacts (for example, engineered gene drives; self-spreading vaccines to sterilize invasive alien species; and genome editing of Douglas fir to reduce invasiveness) • Addressing of extinction pressure from invasive alien species (for example, engineered gene drives to address vectors of avian malaria; and engineered tolerance to bufotoxin in northern quolls)
Target 7	• Degradation of pollutants (for example, microbial consortiums to detoxify industrial waste; and bacteria with enzymes engineered to degrade ocean plastic and mirror life) • Capturing of pollutants (for example, fermentation of industrial off-gases; and algae or fungi engineered to adsorb heavy metals in mine tailings) • Reduced agrochemical use (for example, crops with resistance to fungal pathogens or insect pests; microbes modified to produce biopesticides or bioherbicides; and engineered nitrogen-fixing bacteria)
Target 8	• Carbon-negative bioproduction (for example, microorganisms and algae modified for production of biofuels, industrial chemicals and bioplastics) • Replacement of associated emissions due to manufacturing (for example, petrochemical precursors; industrialized fertilizers; and lower required temperatures) • Engineered adaptation to climate change (for example, abiotic stress tolerance in crops; and resilience in coral microbiomes)
Target 9	• Sustainable production of biodiversity-based pharmaceuticals and medicines (for example, metabolically engineered microorganisms to produce pharmaceuticals)
Target 10	• Improved crop performance (for example, crops engineered for improved biotic and abiotic resilience, improved nutritional profile and increased yields; and engineered rhizobia for polyunsaturated fatty acid enrichment in soybean) • Genetic control of pests (for example, engineered gene drives) • Reduced environmental impact of animal rearing (for example, cultured meat products; and microbial production of fish feed protein) • Improved livestock production and husbandry (for example, genome edited pigs and goats for disease resistance; and genome edited tilapia for increased growth)

Target of the Framework	*Contextualized use(s) (with illustrative examples)*
Target 11	• Addressing of zoonotic disease spillover (for example, self-spreading vaccines for wildlife) • Supporting ecosystem services (for example, engineered soil microbiomes; engineered bacteria to address honeybee parasites; and engineered microorganisms to rehabilitate watersheds or pastoral lands) • Stabilization of threatened ecosystems (including through engineered corals or coral microbiomes to support resilience and ecological integrity of reef ecosystems)
Target 12	• Improved urban green spaces (for example, engineered native plants for urbanized environments; engineered bacteria or fungi for use in nursery cultivation of urban trees; and biobased materials for emissions reduction)
Target 13	• Fair and equitable sharing of monetary and non-monetary benefits generated from the use of digital sequence information on genetic resources and genetic resources in synthetic biology applications in line with Articles 8(j) and 15 of the Convention and decision 16/2 of the Conference of the Parties
Target 16	• Biomining (for example, plants, fungi or bacteria engineered to recover rare metals from waste or produce chelators to recover critical metals from novel sources) • Recycling and waste reduction (for example, microbial strains engineered to produce high-value chemicals from agricultural waste; and microbes to depolymerize plastics) • Production of novel materials (for example, bioplastics, spider silks and polyimide films for electronics) • Reduced food waste and loss (for example, biosensors to detect smoke contamination in grapes)
Target 17	• Biocontainment strategies (for example, suicide genetic circuits; and genetically engineered reduced invasiveness)
Target 19	• Mobilization of resources from synthetic biology companies (for example, providing venture capital for nature-based solutions and/or ecosystem-based approaches; and resources for national biodiversity strategies and action plans)
Target 20	• Strengthened capacity through regional and shared facilities with advanced synthetic biology tools • Development of advanced innovation platforms (for example, biofoundries enabling high-throughput organism design: road mapping; and other policy initiatives)

Annex IV
Selected information related to the potential positive and potential negative impacts of the most recent technological developments in synthetic biology

1. The information presented in the present annex was compiled based on the discussions and work of the Ad Hoc Technical Expert Group on Synthetic Biology. It reflects the preliminary considerations of the Expert Group related to artificial intelligence and computational biology.

2. It should be noted that the members of the Expert Group did not have sufficient time to address the other four identified priority areas, namely, bioremediation and waste reduction applications; artificial cells, synthetic genomics and artificial biochemical pathways; applications for conservation use; and microbiome engineering. Comprehensive information related to their potential positive and potential negative impacts can be found in document CBD/SYNBIO/AHTEG/1/2.

Artificial intelligence and computational biology

(a) Potential positive impacts:

(i) Accelerated development of conservation tools;

(ii) Expanded research participation through open access tools;

(iii) Improved predictive modelling for risk assessments;

(iv) Optimization of the fitness of living modified organisms, including the development of highly competitive varieties or strains, which may provide benefits in contained or controlled environments.

(b) Potential negative impacts:

(i) Increased opportunities for misuse of artificial intelligence;

(ii) Potential dual-use concerns;

(iii) Reduced human oversight as a result of convergence of artificial intelligence and automation;

(iv) Increased challenges to conducting risk assessment owing to lack of transparency in algorithmic decisions or findings;

(v) Negative socioeconomic impacts and inequitable benefit-sharing related to displacement of traditional systems of knowledge and livelihoods of indigenous peoples and local communities, women and youth, arising from replacement of natural products with artificial intelligence facilitated synthetic equivalents;

(vi) Resource intensive nature, and environmental and social costs, of the computational infrastructure of artificial intelligence;

(vii) Concentration of data and analytical capacity in a few actors;

(viii) Concerns regarding fair access and benefit-sharing raised by asymmetrical control and ownership of data and analytical capacity;

(ix) Increased fitness of living modified organisms designed using artificial intelligence, such as super-competitive plant varieties and microbial strains, which could potentially be harmful if released;

(x) Speed of development outpacing regulatory oversight and detection capacity.