



Convention on Biological Diversity

Distr.: General

7 June 2026

Original: English

Subsidiary Body on Scientific, Technical and Technological Advice

Twenty-eighth meeting

Nairobi, 27 July–1 August 2026

Item 5 of the provisional agenda*

Synthetic biology

Synthetic biology**

Note by the Secretariat

I. Introduction

1. In decision [16/21](#), the Conference of the Parties to the Convention on Biological Diversity decided to develop a thematic action plan to support capacity-building and development, access to and transfer of technology and knowledge-sharing in the context of synthetic biology for the implementation of the three objectives of the Convention and the Kunming-Montreal Global Biodiversity Framework, in line with the long-term strategic framework for capacity-building and development.¹
2. In the same decision, the Conference of the Parties established a new ad hoc technical expert group tasked with, among other things, in relation to the three objectives of the Convention and the implementation of the 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 draft thematic action plan.
3. Furthermore in the same decision, the Secretariat of the Convention was requested to: prepare a draft thematic action plan; commission an independent scientific study on synthetic biology; convene discussions of the Open-ended Online Forum on Synthetic Biology; prepare syntheses of information related to the submissions of information on synthetic biology and the discussions of the online forum; submit the draft thematic action plan for peer review prior to the twenty-eighth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice; convene meetings of the Expert Group; and facilitate capacity-building activities, among other things.
4. The Subsidiary Body was requested to consider the outcomes of the work of the Expert Group and the thematic action plan with a view to submitting a draft decision for consideration by the Conference of the Parties at its seventeenth meeting.
5. The present document contains a description of the activities undertaken pursuant to the requests in decision [16/21](#) (sect. II) and a draft recommendation for consideration by the Subsidiary

* [CBD/SBSTTA/28/1](#).

** The present document is being issued without formal editing, with the exception of the draft decision in section III.

¹ Decision [15/8](#), annex I.

Body (sect. III). Annex I contains information related to the current benefits of synthetic biology; annex II contains information related to the potential benefits of synthetic biology; annex III contains selected information related to the potential positive and the potential negative impacts of the most recent technological developments in synthetic biology; annex IV contains the conclusions of the Expert Group; and annex V contains a table showing the estimated extrabudgetary resource requirements for the activities proposed in the draft decision.

II. Overview of the process set out in decision [16/21](#)

A. Overview of the information gathering processes and outcomes of the meeting of the Ad Hoc Technical Expert Group on Synthetic Biology

1. Information gathering and compilation

6. The information gathering processes during the intersessional period consisted of submissions of information on synthetic biology, discussions of the Open-ended Online Forum on Synthetic Biology and an independent scientific study on synthetic biology.

7. Through notifications Nos. [2025-065](#) and [2025-088](#), the Secretariat invited Parties, other Governments, indigenous peoples and local communities, women organizations, youth organizations, academia, research institutions, the business sector and relevant organizations to submit information on synthetic biology to support the work of the Expert Group and the preparation of the thematic action plan. In response to this, the Secretariat received 29 submissions from 19 Parties,² the Secretariat of one multilateral environmental agreement³ and nine organizations.⁴ The information submitted on synthetic biology was synthesized in document [CBD/SYNBIO/AHTEG/1/INF/1](#).

8. The Open-ended Online Forum on Synthetic Biology was convened from 23 February to 6 March 2026. A total of 185 interventions were made, of which 91 were from 26 Parties, 2 were from one non-Party and 92 were from 33 organizations. The Forum was moderated by Martin Batič (Slovenia). The discussions were summarized in document [CBD/SYNBIO/AHTEG/1/INF/2](#).

9. Through notification No. [2025-070](#), the Secretariat conducted an expression of interest process to commission the independent scientific study on synthetic biology. The Brazilian Association of Bioinnovation, the National Service for Industrial Training Institute of Innovation in Biodiversity and Circular Economy and the National Service for Industrial Training Institute of Innovation in Biosynthetics and Fibres were selected to conduct an independent scientific study on synthetic biology. The first draft of the independent scientific study on synthetic biology was submitted for peer-review through notification No. [2026-032](#). Some 26 submissions were received from 15 Parties⁵ and 11 organizations.⁶ The finalized study was presented as document [CBD/SYNBIO/AHTEG/2026/1/INF/3](#).

2. Meeting of the Ad Hoc Technical Expert Group on Synthetic Biology

10. The Expert Group met in-person from 19 to 22 May 2026. The meeting was attended by 16 experts from Parties, one expert from a non-Party, one expert from indigenous peoples and local communities, one expert from women organizations, one expert from youth organization and eight

² Australia, Austria, Bangladesh, Belarus, Belgium, Brazil, Canada, Colombia, Denmark, European Union, Finland, Germany, Hungary, Mexico, Niger, Spain, Thailand, Yemen and Zimbabwe.

³ Convention on International Trade in Endangered Species of Wild Fauna and Flora.

⁴ Action Group on Erosion, Technology and Concentration, African Society for Synthetic Biology, Central Committee on Biological Safety, Federation of German Scientists, Global Industry Coalition, Global Youth Biodiversity Network, McMaster University, Testbiotech and Third World Network.

⁵ Argentina, Belgium, Brazil, Colombia, European Union, Finland, France, Germany, Italy, Japan, Malaysia, Mexico, New Zealand, Niger and Türkiye.

⁶ Engineering Biology Research Consortium, Federation of German Scientists, Friends of the Earth United States, Global Industry Coalition, J. Craig Venter Institute, McMaster University, Pollinis, Rio Institute, Save Our Seeds, Third World Network and University of Rhode Island College of Pharmacy.

experts from observer organization. Two informal webinars were also held on 3 March and 11 May 2026 to support the work of the experts.

11. In addressing their mandate, the Expert Group identified an initial list of the current benefits of synthetic biology, which are presented in annex I. In doing so, the Group had differing perspectives on what could be considered to be a benefit and noted that there is a lack of mechanisms or methodologies for identifying or quantifying the benefits associated with synthetic biology in the context of the Framework.

12. The Expert Group additionally identified the potential benefits of synthetic biology, which are presented in annex II. The potential benefits of synthetic biology were contextualized in line with the targets of the Framework and illustrative examples were provided. However, the Group noted that the benefits would be context-specific, the links to the Framework may require additional consideration and the connection to the indicators of the monitoring framework have yet to be established.

13. The Expert Group also considered the most recent technological developments in synthetic biology based on the information gathered to support their work, including from the submissions of information and the discussions of the online forum.⁷ The Group prioritized the following areas of technological development: applications for conservation use; artificial cells, synthetic genomics and artificial biochemical pathways; artificial intelligence and computational biology; bioremediation and waste reduction applications; and microbiome engineering.

14. Owing to time constraints, the Expert Group then provided some preliminary considerations related to artificial intelligence and computation biology, while noting that more comprehensive information related to the other four areas can be found within document [CBD/SYNBIO/AHTEG/1/2](#). These considerations are provided in annex III.

15. To fulfil their mandate, the Expert Group considered the use of the thematic action plan in the light of future developments in synthetic biology. In this regard, the Expert Group noted that the approach taken should be agile and forward-looking in nature and suggested that Parties would benefit from horizon scanning and foresight activities.

16. In considering their deliberations, the Expert Group provided their overall conclusions, which are presented in annex IV. The importance of best available multidisciplinary scientific information, participatory approaches and capacity-building was emphasized. The Group also recognized the importance of anticipatory approaches, including horizon-scanning and monitoring mechanisms, to support the timely identification and assessment of potential positive and potential negative impacts of synthetic biology.

17. The report of the meeting is contained in document [CBD/SYNBIO/AHTEG/2026/1/3](#).

B. Development of the thematic action plan in the context of synthetic biology

18. In response to the request to prepare a draft thematic action plan in decision [16/21](#), the Secretariat commissioned the Institute of Genetics and Cytology of the National Academy of Sciences of Belarus to assist with its preparation.

19. The thematic action plan was based on the submissions of information received in response to notifications Nos. [2025-065](#) and [2025-088](#).

20. The first draft of the thematic action plan was submitted for peer review through notification No. [2025-149](#), in which 36 submissions were received from 17 Parties,⁸ one non-Party⁹ and

⁷ [CBD/SYNBIO/AHTEG/2026/1/2](#), [CBD/SYNBIO/AHTEG/2026/1/INF/1](#), and [CBD/SYNBIO/AHTEG/2026/1/INF/2](#).

⁸ Argentina, Armenia, Australia, Brazil, Canada, Colombia, Egypt, El Salvador, France, Germany, Guyana, Lithuania, Mexico, Niger, Panama, Slovenia and South Africa.

⁹ United States of America.

18 organizations.¹⁰ The Institute of Genetics and Cytology and the Secretariat then finalized the thematic action plan in response to the comments received during the peer review process.¹¹

21. In considering the work undertaken with respect to the Convention, including the variety of action plans that have been developed, the Capacity-building Action Plan for the Cartagena Protocol on Biosafety¹² and the Capacity-building and Development Action Plan for the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization¹³ were identified as the primary action plans with capacity-building elements with direct relevance to synthetic biology. Thus, no further mapping of the plans developed under the Convention was conducted. However, reference to these other plans was made where appropriate.

22. The first draft of the thematic action plan contained indicators. However, in response to the peer review comments received and considering that the indicative actions present within the thematic action plan are voluntary, indicators could not be further developed or refined. Therefore, the indicators have been removed from the plan.

23. The updated thematic action plan is presented as document [CBD/SBSTTA/28/4/Add.1](#).

C. Capacity-building on synthetic biology

24. In decision [16/21](#), the Conference of the Parties to the Convention urged Parties to provide financial and technical support for capacity-building and development and for technology transfer initiatives, including for research and development and for assessment in the field of synthetic biology. In the same decision, it requested the Executive Secretary of the Convention to facilitate capacity-building activities on synthetic biology.

25. In response to these requests, the Federal Agency for Nature Conservation of Germany and the Secretariat of the Convention, with financial support from the Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety of Germany, co-organized a capacity-building workshop on synthetic biology on the Isle of Vilm, Germany, from 3 to 7 November 2025.

26. The workshop was attended by 19 participants from 18 Parties, who became acquainted with the processes related to synthetic biology under the Convention and the most recent developments in the field of synthetic biology. The workshop also provided an opportunity for participants to exchange information and experiences in the context of synthetic biology and gain an understanding of different regional needs in terms of capacity-building and development, access to and transfer of technology and knowledge-sharing.

27. The report of the workshop was issued as [CBD/SYNBIO/WS/2025/1/2](#).

III. Recommendation

28. Pursuant to decision [16/21](#), the draft thematic action plan is to be considered by the Subsidiary Body on Scientific, Technical and Technological Advice at the present meeting, while the implementation aspects of the plan are to be considered by the Subsidiary Body on Implementation at its seventh meeting. The resulting draft recommendations of both subsidiary bodies will be

¹⁰ African Centre for Biodiversity, Cabot Institute for the Environment, CBD Women's Caucus/Eco Maxei, ETC Group, Federation of German Scientists, Friends of Earth U.S., Foundation for Future Farming/Save Our Seeds, GeneEthics, German Association for Synthetic Biology, Ghent University, Global Industry Coalition, Global Youth Biodiversity Network, Global Youth Online Union, International Union for Conservation of Nature, McMaster University, Pollinis, Rio Institute and Third World Network.

¹¹ The comments received have been made available through the [Biosafety Clearing-House](#). Responses to the comments are available at [www.cbd.int/synbio/current_activities/thematic.shtml](#).

¹² Decision [CP-10/4](#), annex.

¹³ Decision [NP-5/3](#), annex.

consolidated by the Secretariat in the compilation of draft decisions to be submitted at the seventeenth meeting of the Conference of the Parties.

29. The Subsidiary Body on Scientific, Technical and Technological Advice may wish to recommend that the Conference of the Parties adopt elements of a decision¹⁴ along the following lines:

The Conference of the Parties,

Recalling decisions [14/19](#) of 29 November 2018, [15/31](#) of 19 December 2022 and [16/21](#) of 1 November 2024,

1. *Welcomes* the outcomes of the meeting of the Ad Hoc Technical Expert Group on Synthetic Biology;¹⁵

2. *Adopts* the thematic action plan to support capacity-building and development, access to and transfer of technology and knowledge-sharing in the context of synthetic biology for the implementation of the Convention on Biological Diversity¹⁶ and the Kunming-Montreal Global Biodiversity Framework,¹⁷ as contained in annex I to the present decision;

3. *Notes* the initial, illustrative examples of current benefits of synthetic biology in relation to the targets of the Framework, as set out in annex II to the report of the Ad Hoc Technical Expert Group;

4. *Also notes* the potential benefits of synthetic biology in relation to the targets of the Framework, as set out in annex III to the report of the Ad Hoc Technical Expert Group;

5. *Further notes* the potential positive and potential negative impacts of the most recent technological developments in synthetic biology,¹⁸ and decides that work should continue on the following specific areas of technological development:

- (a) Applications for conservation use;
- (b) Artificial cells, synthetic genomics and artificial biochemical pathways;
- (c) Artificial intelligence and computational biology;
- (d) Bioremediation and waste reduction applications;
- (e) Microbiome engineering;

6. *Decides* to establish a new ad hoc technical expert group on synthetic biology, in accordance with the terms of reference contained in annex II to the present decision;

7. *Invites* Parties, other Governments, indigenous peoples and local communities, women and youth organizations, academia, research institutions, the business sector and relevant organizations to submit information on the areas of technological development listed in paragraph 5 above and, as appropriate, any other relevant areas of development;

8. *Decides* to convene new discussions of the Open-ended Online Forum on Synthetic Biology to gather information related to the areas of technological development listed in paragraph 5 above and, as appropriate, any other relevant area of development;

¹⁴ The estimated extrabudgetary resource requirements for the activities outlined in the draft decision are shown in annex V to the present document.

¹⁵ See [CBD/SYNBIO/AHTEG/2026/1/3](#).

¹⁶ United Nations, *Treaty Series*, vol. 1760, No. 30619.

¹⁷ Decision 15/4, annex.

¹⁸ See [CBD/SYNBIO/AHTEG/2026/1/2](#), annex II.

9. *Encourages* Parties, other Governments and relevant organizations to facilitate capacity-building and development in the field of synthetic biology in the context of the Convention and the Framework;

10. *Requests* the Executive Secretary, subject to the availability of resources:

(a) To synthesize the information on synthetic biology submitted pursuant to paragraph 7 above and the discussions of the Open-ended Online Forum referred to in paragraph 8 above to support the work of the Ad Hoc Technical Expert Group on Synthetic Biology;

(b) To convene at least one meeting of the Ad Hoc Technical Expert Group on Synthetic Biology before a meeting of the Subsidiary Body on Scientific, Technical and Technological Advice held before the eighteenth meeting of the Conference of the Parties;

(c) To support the full and effective participation of indigenous peoples and local communities in the work related to synthetic biology undertaken under the Convention, in accordance with decision [X/40](#) of 29 October 2010;

(d) To support further the participation of women and youth organizations, academia and research institutions in the work related to synthetic biology undertaken under the Convention;

(e) To cooperate with international organizations actively working in the field of synthetic biology;

11. *Requests* the Subsidiary Body on Scientific, Technical and Technological Advice to consider at a meeting held before the eighteenth meeting of the Conference of the Parties the outcomes of 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.

Annex I

Thematic action plan to support capacity-building and development, access to and transfer of technology and knowledge-sharing in the context of synthetic biology for the implementation of the Convention on Biological Diversity and the Kunming-Montreal Global Biodiversity Framework

[Placeholder for the thematic action plan, the draft of which is contained in the annex to document CBD/SBSTTA/28/4/Add.1.]

Annex II

Terms of reference for the Ad Hoc Technical Expert Group on Synthetic Biology

1. The Ad Hoc Technical Expert Group on Synthetic Biology shall be convened in compliance with section H of the consolidated modus operandi of the Subsidiary Body on Scientific, Technical and Technological Advice¹⁹ with membership expanded to four experts by region.

2. The procedure for avoiding or managing conflicts of interest in expert groups set out in the annex to decision [14/33](#) of 29 November 2018, as amended in decision [16/26](#) of 1 November 2024, shall apply to the Ad Hoc Technical Expert Group.

3. The Ad Hoc Technical Expert Group is to:

¹⁹ Decision [VIII/10](#), annex III.

(a) Assess the five areas of technological development listed in paragraph 5 of the present decision;

(b) Assess any other areas of technological development identified in the submissions and the Open-ended Online Forum on Synthetic Biology referred to in paragraphs 7 and 8, respectively, of the present decision;

(c) Provide recommendations on ways to address the areas of technological development, as necessary;

(d) Prepare a report on the outcomes of its work for consideration by the Subsidiary Body on Scientific, Technical and Technological Advice at a meeting held before the eighteenth meeting of the Conference of the Parties.

4. The Ad Hoc Technical Expert Group will build upon previous work conducted under the Convention on Biological Diversity²⁰ and its Protocols, while ensuring a coordinated, complementary and non-duplicative approach.

5. The Ad Hoc Technical Expert Group will work on the basis of the synthesis prepared by the Secretariat pursuant to subparagraph 10 (a) of the present decision and, as necessary, other relevant technical information.

²⁰ United Nations, *Treaty Series*, vol. 1760, No. 30619.

Annex I

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 biology¹ 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

<i>Example</i>	<i>Targets of the Framework</i>	<i>Current benefit(s)</i>
- 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 (<i>Artemisia annua</i>))	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 in decision [XIII/17](#).

Annex II

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 biology¹ 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

<i>Target of the Framework</i>	<i>Contextualized use(s) (with illustrative examples)</i>
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](#).

<i>Target of the Framework</i>	<i>Contextualized use(s) (with illustrative examples)</i>
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)

<i>Target of the Framework</i>	<i>Contextualized use(s) (with illustrative examples)</i>
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 III

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.

Annex IV

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 V

Estimated extrabudgetary resource requirements

The table below has been prepared to show the estimated extrabudgetary resource requirements for the activities requested of the Secretariat, as outlined in the draft decision, in support of its consideration. The present annex is not part of the draft decision submitted for consideration by the Subsidiary Body.

Extrabudgetary resource requirements (United States dollars)

<i>OP</i>	<i>Activity</i>	<i>Meeting costs^a</i>	<i>Staff travel</i>	<i>Staff costs^b</i>	<i>Subtotal</i>	<i>PSC (13 per cent)</i>	<i>Total</i>
10 (b)	Convene a meeting of the Ad Hoc Technical Expert Group	63 200	–	–	63 200	8 216	71 416
10 (c)	Support two representatives of indigenous peoples and local communities in the meeting of the Expert Group	9 200	–	–	9 200	1 196	10 396
10 (d)	Support one representative each of women organizations, youth organizations, academia and research institutions in the meeting of the Expert Group	15 200	–	–	15 200	2 516	17 716
10 (e)	Secretariat attendance at meetings of international organizations working in the field of synthetic biology	–	18 500	–	18 500	2 405	20 905
Total					106 100	14 333	120 433

Abbreviations: PSC, programme support costs; OP, operative paragraph of the draft decision.

^a Including participants' travel.

^b Consultants, partners and additional staff.