



PRESS RELEASE

Comprehensive report on synthetic biology discusses impacts on biodiversity and reviews existing regulatory regimes

Montreal, 20 April 2015 – A new report from the Secretariat of the Convention on Biological Diversity discusses the potential for synthetic biology to have both positive and negative impacts on biodiversity and looks at the role and adequacy of existing risk assessment and regulatory regimes to evaluate the impact of these technologies.

The report, developed on a review of the literature and on the basis of information and views submitted by Parties to the Convention on Biological Diversity (CBD) and other stakeholders, including through a peer review process, aims to support the emerging international debate on synthetic biology. It provides technical information on the potential impacts of synthetic biology on biodiversity and how adequately existing regulations, including risk assessment and international regulatory regimes, cover the components, organisms and products of synthetic biology.

While there is no internationally agreed definition of “synthetic biology”, there is some agreement that key features of synthetic biology include the “de novo” synthesis of genetic material and an engineering-based approach to develop components, organisms and products. Synthetic biology builds on techniques of modern biotechnology, such as high-throughput DNA technologies and bioinformatics.

Many of the current and near-term commercial and industrial applications of synthetic biology are aimed at creating microorganisms that synthesize products to be used as fuels, pharmaceuticals, chemicals, flavourings and fragrances.

Covering a variety of cases, the report shows that many of the applications of synthetic biology are aimed at developing more efficient and effective ways to respond to a number of environmental and health challenges and therefore could have benefits for the conservation and sustainable use of biodiversity, including:

- The development of microorganisms designed for bioremediation and biosensors that can contribute to pollution control;
- Synthesizing products, such as chemicals or drug precursors that are currently extracted from plant or animal sources, in order to reduce pressure on wild species that are currently threatened due to overharvesting or hunting;



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- Developing organisms designed to generate biofuels, which may lead to decreased dependence on non-renewable energy sources;
- Producing agricultural crops that are tolerant to abiotic stress and pests;
- Restoring genetic diversity by reintroducing extinct genes, or even “de-extinction” of species.

However, organisms and products of synthetic biology could also have negative impacts on the conservation and sustainable use of biodiversity, including, for example:

- The transfer of genetic material from microbes which were produced through synthetic biology and released into the environment, to other microorganisms could have unforeseeable consequences;
- The use of “gene drive” systems to spread traits aimed at suppressing populations of disease vectors (such as mosquitoes) could lead to the introduction of new diseases through the replacement of the population of the original disease vector by another vector species;
- Possible toxic and other negative effects on non-target organisms, such as soil microorganisms, beneficial insects, other animals and plants;
- Potential negative impacts to the conservation and sustainable use of biodiversity could arise from the transfer of genetic material to wild populations via vertical gene transfer and introgression.

Applications in which the organisms that have been produced using synthetic biology techniques are intended for environmental release will likely raise biosafety concerns different from those of organisms intended for contained use.

Like other modern biotechnologies, synthetic biology raises ethical questions around the potential benefits weighed against the impacts from potential unintended consequences.

The report also discusses a number of treaties which, in general, can or may provide for mechanisms, procedures or institutions that could address potential negative effects associated with the application of synthetic biology techniques. These include the Convention on Biological Diversity’s biosafety provisions as well as provisions under its Cartagena Protocol for Biosafety.

The report suggests that existing biosafety risk assessment frameworks may be sufficient to assess the risks of current and near-term applications of synthetic biology to the conservation and sustainable use of biodiversity. As synthetic biology develops, this assessment may need to be revisited. Further work is being conducted to define and better understand the regulatory landscape for synthetic biology.

The report is available online at: www.cbd.int/ts/cbd-ts-82-en.pdf.

The Convention on Biological Diversity (CBD)

The Convention on Biological Diversity (CBD) opened for signature at the Earth Summit in Rio de Janeiro in 1992 and entered into force in December 1993. The Convention on Biological Diversity is an international treaty for the conservation of biodiversity, the sustainable use of the components of biodiversity and the equitable sharing of the benefits derived from the use of genetic resources. With 194 Parties up to now, the Convention has near universal participation among countries. The Convention seeks to address all threats to biodiversity and ecosystem services, including threats from climate change, through scientific assessments, the development of tools, incentives and processes, the transfer of

technologies and good practices and the full and active involvement of relevant stakeholders including indigenous peoples and local communities, youth, NGOs, women and the business community. The Cartagena Protocol on Biosafety and the Nagoya Protocol on Access and Benefit Sharing are supplementary agreements to the Convention. The Cartagena Protocol, which entered into force on 11 September 2003, seeks to protect biological diversity from the potential risks posed by living modified organisms resulting from modern biotechnology. To date, 169 Parties have ratified the Cartagena Protocol. The Nagoya Protocol aims at sharing the benefits arising from the utilization of genetic resources in a fair and equitable way, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies. It entered into force on 12 October 2014 and to date has been ratified by 59 Parties. For more information visit: www.cbd.int. For additional information, please contact: David Ainsworth on +1 514 287 7025 or at david.ainsworth@cbd.int; or Johan Hedlund on +1 514 287 6670 or at johan.hedlund@cbd.int
