

A need for recalibrating access and benefit sharing

How best to improve conservation, sustainable use of biodiversity, and equitable benefit sharing in a mutually reinforcing manner?

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The 15th UN Biodiversity Conference (COP-15) in Kunming, China, presents an opportunity for transformative change to address the biodiversity crisis. However, a lack of consensus on two key issues—mobilization of the necessary resources; and the scope and functioning of regulatory regimes that govern access to genetic resources and the sharing of benefits resulting from their use—threaten progress under the next 10-year strategic plan of the Convention on Biological Diversity. We highlight systemic misconceptions concerning the financing of biodiversity and the burden this places on the Access and Benefit Sharing (ABS) system. We caution that unworkable ABS regulatory frameworks and conflating ABS with resource mobilization could disrupt science policies built on open access, with potentially severe ramifications for research and innovation. To resolve these tensions, we call for a recalibration of ABS to maximize the value delivered by biodiversity for all of society, including indigenous peoples and local communities.

Time for action on biodiversity

High hopes and expectations had been placed on 2020 as the “Super Year for Nature”. The 15th UN Biodiversity Conference (COP-15), which will be concluded in 2022 in Kunming, China, is set to endorse the “post-2020 global biodiversity

framework” (GBF), which will become the next 10-year strategic plan for the Convention on Biological Diversity (CBD). The delays wrought by the SARS-CoV-2 pandemic have not dampened expectations; indeed, the ongoing GBF negotiations will likely benefit from the extension of time and the parallel discussions in the context of the UN Decade on Ecosystem Restoration (2021–2030; <https://www.decadeonrestoration.org/>), the 26th UN Climate Change Conference (<https://ukcop26.org/>), the UN Food Systems Summit (<https://www.un.org/en/food-systems-summit>), and the UN Ocean Conference (<https://www.un.org/en/conferences/ocean2020>), all taking place in the current period.

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Time is of the essence. We are facing a global decline of ecosystems and the abundance and number of wild species (Díaz *et al.*, 2019), which led UN Secretary General António Guterres to proclaim that “humanity is waging war on nature, and we need to rebuild our relationship with it” (UN Summit

on Biodiversity, New York, Sept. 30, 2020). According to the President of the UN General Assembly, Volkan Bozkir, “Kunming must do for biodiversity what Paris did for climate change in 2015, by elevating the discourse to the mainstream and placing it firmly on the political agenda” (UN Summit on Biodiversity, New York, Sept. 30, 2020). Sir David Attenborough, at the opening ceremony of the 26th UN Climate Change Conference, provided his vision of a possible future: “A new industrial revolution powered by millions of sustainable innovations is essential and is indeed already beginning. We will all share in the benefits: affordable clean energy, healthy air, and enough food to sustain us all. Nature is a key ally. Whenever we restore the wild, it will recapture carbon and help us bring back balance to our planet” (Glasgow, UK, Nov. 1, 2021).

Misconceptions about the financing of biodiversity

Yet, there are major issues that threaten the effectiveness of a GBF, notably the provision of sufficient resources—including financial, human, and technical—to achieve the intended transformative change; and the way access to genetic resources and associated traditional knowledge (ATK) as well as the equitable sharing of benefits from their use are organized. The latter is governed by the CBD and its subsidiary agreement, the

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Nagoya Protocol, and is generally referred to as the overall ABS framework.

To realize the high ambitions of the GBF, some assert that up to one trillion US Dollar per year will be needed to support three different streams of action: conservation of biodiversity through, for instance, protection of species and habitats, and *ex situ* collections; sustainable use of biodiversity; and restoration of damaged ecosystems (Deutz *et al*, 2020). These three streams of action each require a distinct conceptual framework and implementation strategy, but they should be complementary.

ABS is first and foremost an integral part of sustainable use of biodiversity and—even though monetary contributions are one part of benefit sharing—it should not be misconstrued as a primary financing mechanism. Yet, the failure of the international community so far to set aside the necessary resources for preserving biodiversity has nurtured unrealistic expectations about the monetary benefits that should be generated through ABS agreements. By its nature, ABS can and should be expected to contribute only a part of the financial resources needed to achieve the long-term targets of the GBF.

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Parties are also debating whether the scope of ABS obligations should be expanded to “Digital Sequence Information” (DSI), a term that may be interpreted to cover all sequence data and potentially other digital information on genetic resources stored in public databases. Advocates for Open Science and Open Access, including public research organizations and private sector companies, fear that expansion of the formal scope of benefit sharing obligations to DSI would stifle research and innovation, represent a significant roadblock in addressing global challenges, and, ultimately, undermine the ambitions of the CBD and GBF (<https://www.cbd.int/abs/DSI-views/2019/Joint-stakeholder-statement-DSI.pdf>; https://www.leopoldina.org/uploads/tx_leopublication/2021_Digitale_Sequenzinformationen_EN_02.pdf;

https://www.dsmz.de/fileadmin/user_upload/DSMZ/Keep_Digital_Sequence_Information_a_common_good_July_2021.pdf; Gaffney *et al*, 2020; Laird *et al*, 2020). On the other side, a number of providers of genetic resources fear that not including DSI in the formal scope of benefit sharing obligations undermines the principles of the Nagoya Protocol and the fair sharing of benefits (Karger *et al*, 2019).

We believe that the frustrations surrounding DSI, and ABS more broadly, may in fact be proxies for misunderstanding the value and benefits of genetic resources in the overarching context of mobilizing resources. Thus, addressing deficiencies in overall resource mobilization and recognizing the value of sustainable use may provide more realistic discussions on ABS and DSI, and thereby enable improvements within the CBD and other international frameworks.

Misplaced burden in the current ABS system

ABS, which started as an innovative strategy for conservation and sustainable use of biological diversity during the negotiations of the CBD in the late 1980s, has gone beyond its original objective. The intent of the CBD was to “facilitate” access to genetic resources and ATK in order to encourage sustainable and responsible use, with benefits shared with the providers. Today, however, burdensome ABS regimes create a clear bottleneck for collaboration, research, and development, and thereby neither facilitate access enabling sustainable use, nor result in substantial sharing of benefits (Alves *et al*, 2018; Dos S Ribeiro *et al*, 2018; Heinrich *et al*, 2020; Milieu Ltd., 2020; Williams *et al*, 2020; Bertoli *et al*, 2021; Mekonnen & Spielmann, 2021). These constraints and their unintended consequences create barriers to academic research and commercial development. For example, bilateral ABS regimes have been shown to drastically reduce botanical collections and international seed exchange (Bertoli *et al*, 2021), which can negatively impact the development of new crops and technologies to ensure food security (Mekonnen & Spielmann, 2021). Similar concerns have been raised by the scientific community specifically in the context of DSI and global challenges related to health, biodiversity loss, and climate change, which risks undermining progress on the Sustainable Development Goals (SDGs; Gaffney *et al*, 2020).

Most users of genetic resources, including biotechnology companies and the academic research community, have limited impacts on biodiversity loss. Very much to the contrary, they often have long-reaching positive impacts on sustainable development. They are well-placed—and indeed called upon—to alleviate global challenges associated with sustainable development, human and animal health, food security, climate change, and biodiversity loss. Yet, perversely, these are the same stakeholders who bear the burden of regulatory compliance and high transaction costs associated with the current ABS regimes under the CBD and the Nagoya Protocol. This burden often involves significant human and financial resources in typically lengthy processes for approvals, or, in the worst case, the sheer impossibility to obtain approvals—as researchers have reported for instance in Brazil, India, and Indonesia (Alves *et al*, 2018; Milieu Ltd., 2020). The bilateral nature of such regimes, their inherent limitations, the patchwork of different policies, and the focus on monetary benefits instead of value creation and sharing mean that the current ABS framework represents an obstacle for sustainable development.

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To overcome these shortcomings, international policy changes are crucially needed to improve legal certainty, efficiency, and workability. In the ongoing policy discussions, alternative systems for benefit sharing have been proposed, including multilateral systems (<https://www.cbd.int/abs/DSI-webinar/DSIPolicyOptions2021.pdf>; Laird *et al*, 2020; Scholz *et al*, 2020) to replace the current bilateral systems, whereby any institution that seeks access to a genetic resource needs to negotiate with an individual country on a one-to-one basis. Multilateral systems allow to set up general agreements and procedures for larger groups of countries or even globally. However, such alternative systems will only be fit-for-purpose if these

are designed to facilitate access while enhancing value creation and value sharing as mutually reinforcing priorities. This also requires that providers of genetic resources and ATK are empowered to participate in value creation, to realize bioeconomic opportunities, and to access related technologies *inter alia* via capacity building.

ABS must be facilitated to enable sustainable use

Value creation depends on sustainable use of biodiversity while such use cannot be considered truly sustainable without benefit sharing, or more broadly value sharing, in one form or another. Therefore, sustainable use and value sharing are inseparable and should not be considered as distinct ambitions of the CBD. Sustainable use of biological diversity is defined in Article 2 of the CBD as “the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations”. The use of biodiversity, *inter alia* as genetic resources or DSI in research and development, typically does not deplete biological diversity—on the contrary—and can thus be qualified as sustainable use. Both public and private users are called to develop innovations that “meet the needs and aspirations of present and future generations”, namely, food security, human health, and a healthy planet. Such use as defined under the CBD relies on effective access to genetic resources and the open access and exchange of DSI. Policymakers need to revisit this connection and realize that facilitating ABS, including simplified access procedures, directly enables sustainable use and enhances value creation and sharing in a mutually reinforcing manner.

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We need to learn from past errors. In 2010, as part of the 2011–2020 Strategic Plan

for Biodiversity, twenty biodiversity targets—the so-called “Aichi Targets”—were negotiated along with the Nagoya Protocol as part of a political compromise. But the implementation of the Strategic Plan for Biodiversity during the ensuing decade largely failed to meet these targets, and the Nagoya Protocol is also a long-way from a win-win. Skeptics could rightfully call for caution when considering another political compromise, this time between the GBF and DSI. Thus, a science-based and measurable GBF is needed. While ABS should be regarded as an integral part of sustainable use, conservation and restoration require additional means of resource mobilization such as biodiversity impact-based contributions, accounting of value and true costs, green investments, or repealing of biodiversity-damaging subsidies, among others (Delabre *et al*, 2021). These ideas need to be more thoroughly considered and flanked by science-based indicators which—through meaningful impact assessments—will help to effectively guide the intended transformative change in our relationship with nature.

Call for a new ABS framework

Reaching the ambitious goals and targets of the GBF relies upon access to and use of genetic resources for scientific research, especially the open access to and exchange of DSI (O’Connor *et al*, 2021). Value sharing includes, *inter alia*, capacity building, as emphasized by the CBD and the GBF. To enable such sustainable use, we need to rethink the current ABS regimes that have high transaction costs, have created significant thresholds for sustainable use and fail to generate and share the desired value. The potential for standardization or alternative benefit sharing schemes should be seriously investigated, including a detailed assessment of their feasibility and effectiveness for all stakeholders. Our criticism is focused on the unintended consequences of restrictive ABS regulatory systems and potential impediments to open access to and exchange of DSI, and not on value sharing as a principle. Such sharing remains important from an ethical and social responsibility point of view, but depends upon value creation by sustainable use.

Resolving tensions with ABS and overall resource mobilization also calls for more inclusive participation of all relevant stakeholders to ensure appropriate discussion of

the challenges that lie ahead, and sufficient agency to be part of the solution. This must address mechanisms to share value between countries with highly developed research infrastructures and countries that are short on such resources. Governments, indigenous peoples, and local communities, users from both the public and private sector, as well as the financial sector will need to collaborate to ensure that mainstreaming of biodiversity including the integration of negative externalities becomes an integral part of economic models and decision making; otherwise, the trillions in investment required to avert the disaster that is being wrought by the convergence of the climate change and biodiversity crises will remain out of reach.

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The negotiations for the GBF in the lead up to COP-15 provide an opportunity for all stakeholders to recalibrate the ABS discussion—creatively and collaboratively. However, the clock is ticking and we cannot afford to squander another decade owing to a lack of ambition, imagination, a holistic perspective, or ability to compromise. Bold action is required to timely resolve the tensions highlighted in this paper, and to define an ABS framework that is truly fit-for-purpose.

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Conflict of interest

The views and opinions expressed in this article are those of the authors in their personal capacity. None of the observations, opinions, or conclusions expressed herein are to be attributed to or construed as the views or positions of any organization, association, or company. MW and RC are employed by organizations using genetic resources for primarily commercial and

academic use, respectively. RS and DM are consulting clients on sustainability, biodiversity, and ABS.

References

- Alves RJV, Weksler M, Oliveira JA, Buckup PA, Pombal JP, Santana HRG, Peracchi AL, Kellner AWA, Aleixo A, Langguth A *et al* (2018) Brazilian legislation on genetic heritage harms biodiversity convention goals and threatens basic biology research and education. *An Acad Bras Cienc* 90: 1279–1284
- Bertioli DJ, Clevenger J, Godoy IJ, Stalker HT, Wood S, Santos JF, Ballén-Taborda C, Abernathy B, Azevedo V, Campbell J *et al* (2021) Legacy genetics of *Arachis cardenasii* in the peanut crop shows the profound benefits of international seed exchange. *Proc Natl Acad Sci USA* 118: e2104899118
- Delabre I, Rodriguez LO, Smallwood JM, Scharlemann JPW, Alcamo J, Antonarakis AS, Rowhani P, Hazell RJ, Aksnes DL, Balvanera P *et al* (2021) Actions on sustainable food production and consumption for the post-2020 global biodiversity framework. *Sci Adv* 7: eabc8259
- Deutz A, Heal GM, Niu R, Swanson E, Townshend T, Li Z, Delmar A, Meghji A, Sethi SA, Tobin-de la Puente J (2020) Financing nature: closing the global biodiversity financing gap. The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability. https://www.paulsoninstitute.org/wp-content/uploads/2020/10/FINANCING-NATURE_Full-Report_Final-with-endorsements_101420.pdf
- Díaz S, Settele J, Brondízio ES, Ngo HT, Agard J, Arneeth A, Balvanera P, Brauman KA, Butchart SHM, Chan KMA *et al* (2019) Pervasive human-driven decline of life on Earth points to the need for transformative change. *Science* 366: eaax3100
- Dos S Ribeiro C, Koopmans MP, Haringhuizen GB (2018) Threats to timely sharing of pathogen sequence data – The Nagoya Protocol may impose costs and delays. *Science* 362: 404–406
- Gaffney J, Tibebe R, Bart R, Beyene G, Girma D, Kane NA, Mace ES, Mockler T, Nickson TE, Taylor N *et al* (2020) Open access to genetic sequence data maximizes value to scientists, farmers, and society. *Global Food Security* 26: 100411
- Heinrich M, Scotti F, Andrade-Cetto A, Berger-Gonzalez M, Echeverría J, Friso F, Garcia-Cardona F, Hesketh A, Hitziger M, Maake C *et al* (2020) Access and Benefit Sharing under the Nagoya Protocol - quo vadis? Six Latin American case studies assessing opportunities and risk. *Front Pharmacol* 11: 765
- Karger E, du Plessis P, Meyer H (2019) *Digital Sequence Information on Genetic Resources (DSI) – An introductory guide for African policymakers and stakeholders*. Germany: German Society for International Cooperation (GIZ)
- Laird S, Wynberg R, Rourke M, Humphries F, Muller MR, Lawson C (2020) Rethink the expansion of access and benefit sharing. *Science* 367: 1200–1202
- Mekonnen DW, Spielman DJ (2021) Changing patterns in genebank acquisitions of crop genetic materials: an analysis of global policy drivers and potential consequences. *Food Policy* 105: 102161
- Milieu Ltd. (2020) Analysis of implications of compliance with the EU ABS Regulation for research organisations and private sector companies. Study commissioned by the European Commission. Available at: https://ec.europa.eu/environment/nature/biodiversity/international/abs/legislation_en.htm (last accessed on Nov. 2, 2021)
- O'Connor MI, Mori AS, Gonzalez A, Dee LE, Loreau M, Avolio M, Byrnes JEK, Cheung W, Cowles J, Clark AT *et al* (2021) Grand challenges in biodiversity-ecosystem functioning research in the era of science-policy platforms require explicit consideration of feedbacks. *Proc Biol Sci* 288: 20210783
- Scholz AH, Hillebrand U, Freitag J, Cancio I, dos S Ribeiro C, Haringhuizen G, Oldham P, Saxena D, Seitz C, Thiele T *et al* (2020) Finding compromise on ABS & DSI in the CBD: requirements & policy ideas from a scientific perspective. <https://doi.org/10.13140/RG.2.2.35180.80001>
- Williams C, Walsh A, Vaglica V, Sirakaya A, Silva M, Dalle G, Winterton D, Annecke W, Smith P, Kersey PJ *et al* (2020) Conservation policy: helping or hindering science to unlock properties of plants and fungi. *Plants People Planet* 2: 535–545



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