POLICY FORUM

BIODIVERSITY

Rethink the expansion of access and benefit sharing

Several UN policy processes are embracing a calcified approach to conservation and equity in science

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Access and benefit sharing (ABS), a policy approach that links access to genetic resources and traditional knowledge to the sharing of monetary and nonmonetary benefits, first found expression in the 1992 United Nations (UN) Convention on Biological Diversity (CBD). Predicated on the sovereign rights of countries over their biodiversity and associated genetic resources and intended to harness the economic power of those resources to create incentives for and fund biodiversity conservation, the ABS transaction was conceived to foster equitable relations between those parties providing genetic resources and associated traditional knowledge and those wishing to make use of them for research and development. Yet although challenges faced within the CBD suggest that it is time to rethink ABS, several other international policy processes under the auspices of the UN have instead been embracing the ABS approach, and are doing so largely outside of mainstream scientific discourse and attention. The resulting policies could have a major impact on how genetic resources and associated information are collected, stored, shared, and used, and on how research partnerships are configured. We highlight implications for science of the recent expansion of ABS in global policy, in particular the potential incorporation of genetic sequence data.

Moving away from the notion that biodiversity was the "common heritage" of all countries, the CBD affirmed national sovereignty over genetic resources and established a framework for benefit sharing and equity associated with the collection, sharing, and use of genetic resources. The Nagoya Protocol (NP) to the CBD, which entered into force in 2014, provided more detailed mechanisms for implementing ABS and more explicitly linked the CBD's three objectives of conservation, sustainable use, and fair and equitable benefit sharing. Despite acknowledgment of the potential for multilateral approaches, both agreements embedded a bilateral approach to ABS, with the NP emphasizing contracts as a preferred benefit-sharing tool.

The goals of ABS have had broad support in the international diplomacy space, as has the innovative if unproven approach for creating incentives through ABS for biodiversity conservation. But the devil has proven to be in the details. Early on, it became clear that commercial demand for genetic resources was insufficient to incentivize biodiversity conservation. The transactions that did take place under the CBD have yet to generate substantial benefits for conservation (*1*–*3*). Domestic political imperatives have often focused benefit sharing on limited economic development rather than conservation (*4*). Advances were made toward more equitable research partnerships, and in some cases indirect benefits (such as research on threatened biodiversity) resulted, but new bureaucratic hurdles made academic and conservation research more difficult. Even streamlined approaches for noncommercial research required substantial investments of time, money, and capacity to receive permits or sign ABS agreements in countries with unclear legal and administrative structures [e.g., (*3*, *5*, *6*)].

In recent years, concerns associated with ABS policy have expanded and grown more urgent as the CBD and other processes have begun to explore the incorporation of genetic sequence data. Despite its original design as a bridge between advanced technologies and conservation, international ABS policy has focused on the collection and exchange of physical material, largely ignoring developments in biotechnology, which relies heavily on the use of genetic sequence data and information, in addition to physical samples of genetic resources (*7*, *8*). The CBD did not begin work in earnest on "digital sequence information" (DSI) until 2016 (*9*). As part of implementing the NP, the global community is tying itself in knots to retrofit an ABS mechanism designed for physical samples to DSI, and the term DSI itself remains a negotiated placeholder term, the meaning and scope of which remain in dispute.

Many in the scientific community with ABS experience are concerned that DSI might be captured by the same complex ABS policies that they currently must navigate to access physical samples (*3*, *5*). The inclusion of DSI would vastly expand the scope and impact of ABS. However, ABS is a particularly poor policy fit for regulating access to DSI. As currently conceived, ABS presumes that providers and users negotiate agreements and exchange physical material with clear provenance, ownership, and value, and that this material can usually be tracked through the research process, culminating in something of value. DSI turns most of this on its head (*9*, *10*).

Research practices and concepts of ethics and benefit sharing associated with DSI that have evolved in recent decades within the scientific community emphasize openness, transparency, networks, and free exchange. By contrast, ABS is a transactional mechanism that restricts access to genetic resources so that their use can be exchanged for benefits between identified users and providers of these resources. However, to not capture DSI would mean leaving a massive loophole in the ABS endeavor. Users might simply sidestep benefit-sharing obligations by digitizing genetic resources and synthesizing the required nucleic acid fragments with the use of openly accessible DSI. But the question remains as to whether ABS is the best and only way to benefit provider countries, science, and conservation from the use of DSI.

Despite its central role in the policy language of ABS, conservation has faded from the practice of ABS and today is a marginal concern at best. The 2019 global assessment from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services illustrates the extent of biodiversity loss in recent decades (*11*), even as ABS came on line, but the biodiversity crisis has not triggered a reconsideration of conserva-

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tion within the ABS policy process. In fact, disagreements about ABS could undermine ongoing CBD negotiations for a post-2020 global biodiversity framework. At the national level, catastrophic biodiversity loss has often resulted from policies put in place by governments that, despite being keen proponents of ABS, also promote the clearing of biologically diverse habitats for industrial agriculture, mining, logging, and other resource-extractive activities.

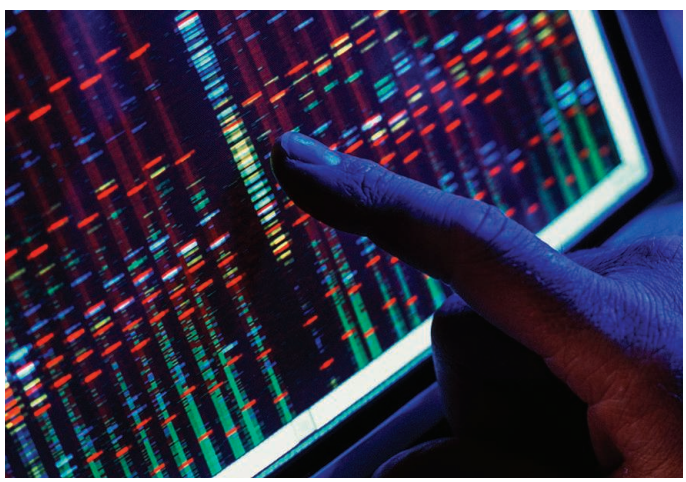
If biodiversity conservation is removed from the ABS formulation as a desirable but unrealized objective, we are left with a policy framework that primarily navigates equity and fairness in science and technology through genetic resource exchange. For decades, ABS has provided an invaluable home for important and otherwise orphaned dialogues on ethics and equity in research, ownership, and control of genetic resources and traditional knowledge, capacity building, technology transfer, and other issues (*12*). However, their inclusion under the ABS banner means that issues relating to equity in advanced science and technology are addressed within the UN partly under the auspices of an environmental treaty, the CBD.

As a result, the Conference of Parties to the CBD makes decisions about scientific research practices that can have impacts far afield from biodiversity conservation. These meetings are generally attended by diplomats from ministries of the environment, often with little experience in genomics, bioinformatics, biotechnology, and related fields. Scientific expertise is available within these processes through expert groups, committees, and other forums, but how expertise is translated for decision-makers is a recurring challenge. Additionally, although these are constituted as scientific and technical bodies, they are nominated by governments and can be highly political and used as negotiating spaces. There are few if any forums where scientists can engage on a neutral platform.

Limited capacity within the policy-making process to understand the technical scientific issues and commercial practices underlying ABS may be one reason why—after almost 30 years, innumerable national ABS measures, and tens of millions of dollars spent discussing and developing these policies—there is relatively little to show in the way of conservation, technology transfer, capacity-building, or other monetary or nonmonetary benefits. Entrenched positions between the global North and South today add to these concerns.

ABS EXPANSION WITHIN THE UN

The challenges faced by ABS within the CBD and NP process, and the belated and still nascent consideration of DSI, might suggest that it is time to rethink ABS and learn lessons from other areas of policy. However, in the past few years, many UN forums have sought guidance from the ABS policy arena rather than from more established ethics platforms. In addition to the CBD and its supplementary NP processes, ABS has been pursued under the World Health Organization (WHO) Pandemic Influenza Preparedness (PIP) Framework for the Sharing of Influenza Viruses and Access to Vaccines and Other Benefits, the International Treaty for Plant Genetic Resources for Food and Agriculture (or "Plant Treaty"), and deliberations under the Convention on the Law of the Sea (UNCLOS).



Cross-border sharing of genetic sequence data may be made more cumbersome under certain UN policies being discussed.

PHOTO: TEK IMAGE/SCIENCE SOURCE

The WHO is perhaps the most forceful in pushing ABS as a solution to its perceived ethical and equity shortcomings on the issue of virus sharing. It originally ventured into ABS through its PIP Framework but has started exploring options for incorporating aspects of the NP into the sharing of other pathogens. Advocacy for the NP in this forum, although an admirable effort to create synergies across UN bodies and to promote the general idea of benefit sharing, ignores the very different goals of the CBD and its ABS mechanism versus the public health mandate of the WHO. Infectious disease research and the public health response require timely sharing of up-to-date pathogen samples and associated DSI, as well as global collaboration across diverse parties. In contrast, the NP emphasizes bilateral negotiation of mutually agreed terms between provider and user parties, which can take years to achieve before samples are actually shared. Already, delays in sharing influenza virus samples between national centers in Southeast Asia and South America, and between centers in France and Switzerland, have reportedly been due to NP compliance concerns (*13*, *14*).

Elsewhere in the UN, countries are negotiating a treaty under the UNCLOS to address governance gaps in the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction (ABNJ). Marine genetic resources (MGRs) found within national waters are covered by the CBD and NP, but countries are exploring how to govern MGRs found in the two-thirds of oceans outside national jurisdiction, which might have an impact on vast ex situ collections of marine samples collected since the CBD entered into force. Although the commercial potential of MGRs from ABNJ to fund conservation and capacity building is unclear, the ABS mechanism has been introduced into the negotiations as a way to redistribute wealth and technology to countries that lack the capacity to exploit and benefit from research on the high seas. Negotiating states have not yet agreed how to operationalize the ABS concept in the unique geopolitical conditions of ABNJ. There are no sovereign rights over MGRs in this area and therefore no "providers" with legal rights to share in the benefits from their use. Multilateral governance options in the draft text (November 2019) include a complex web of procedures for collecting or accessing MGRs, and options for benefit sharing draw from the CBD's approach originally designed for physical materials moving from providers to users. Most concerningly, the lack of agreement on MGR provisions is stalling crucial, and essentially agreed upon, negotiations on mechanisms for area-based management tools, environmental impact assessments, capacity building, and the transfer of marine technology.

Unlike the CBD and UNCLOS, the Plant Treaty addresses the relatively bounded field of food and agriculture, with a more clearly identified constituency, relatively actively involved in policy-making. The Plant Treaty ABS model has its own structure and logic, which evolved from long-standing tensions between developing and

developed countries about access to and ownership of plant genetic resources in ex situ collections, linked to the expansion of intellectual property over plant varieties. This, combined with concerns about ensuring uninterrupted germ plasm flows for research and innovation, led to the establishment of a multilateral mechanism for pooling benefits and sharing them through governments, based in part on a list of 64 key crops essential for food security.

Like the CBD and NP, however, the Plant Treaty is shackled by an overly contractual approach, geared toward capturing private market values for conservation, without an indication of how this can be achieved. It is also similarly struggling to address the nonmaterial aspects of plant genetic resources such as genetic sequence data (*10*, *15*). To avoid some of the complicated contracting arrangements required by the CBD and NP, the Plant Treaty has a simpler, standard-form, "take it or leave it" ABS contract (the Standard Material Transfer Agreement or SMTA), but monetary and other benefits have not met government expectations, and attempts to redraft the SMTA remain mired in controversy.

Finally, ABS has been engaged by the UN Sustainable Development Goals (SDGs), anticipating that ABS will contribute toward ending poverty and hunger (Goal 2) and protecting life on land (Goal 15). With the problems already apparent within the CBD and related processes, it appears fanciful to imagine ABS, as currently practiced, delivering on these and other SDGs.

TIME FOR A NEW APPROACH

That multiple UN forums are reaching for the ABS mechanism makes clear the urgent need for a global institutional and conceptual framework for ethical research and commercialization, and the environmental and social implications of scientific and technological advances. But ABS is not that framework. We fully support the goals of ABS and the efforts of those working within the CBD, WHO, Plant Treaty, UNCLOS, and elsewhere to make scientific research and commercialization more equitable and sustainable. There are clear inequities between the global North and South in research funding, control over resources and data, benefit sharing, and other issues that must be addressed. But ABS has calcified over the years around a bilateral transaction for physical samples that is marginal to contemporary research and development, and the dissonance between ABS and the scientific endeavor more broadly is only increasing. A new approach for ethically sharing the benefits of science and technology is sorely needed.

First, as the global community confronts massive and catastrophic biodiversity loss, the enormous sums of money and time spent nursing the hope that indirect economic incentives from high-tech sectors through ABS will conserve biodiversity should be reconsidered. It's also quite possible that the substantial funding allocated for ABS implementation has had the unintended consequence in many countries of diverting government attention away from biodiversity conservation.

Second, more researchers and their organizations, from a wider range of fields, particularly those that may be affected by the inclusion of DSI, should participate in policy processes—attend UN meetings, write background documents tailored to policy-making, and work with national delegates and focal points to develop alternative approaches to equitable research and commercialization. This will require training scientists to engage with complex policy processes and to cross disciplinary boundaries. Funders and research institutions might support the engagement of scientists in policy processes as part of grant applications and institutional policies. Correspondingly, these UN forums and Parties to Conventions must make a real effort to ensure that scientific and technical bodies comprise experts in relevant fields, that they contribute unhindered by negotiating positions, and that decision-makers are well versed in the latest scientific and technological developments.

Finally, we propose taking a step back and focusing on first principles and the foundational objectives of each respective policy process. Working from these, we can best identify how each process can contribute to biodiversity conservation, social justice, equitable research and commercialization, and public health. We can then explore legal, ethical, and policy approaches that might achieve the objectives.

New and encouraging ideas and approaches to ABS, and ethical research more broadly, have emerged in recent years, including more open-access strategies that better address science as it is increasingly practiced. Proposals include delinking access from benefit sharing for DSI, which would secure benefits while maintaining open science and generating funds from taxes, levies, or tiered approaches that feed a multilateral fund (*8*). Such funds have a poor track record to date, and if targeted to biodiversity conservation, they should also be funded by sectors destructive to biodiversity (e.g., oil, mining, logging, and industrial agriculture), not only those researching biodiversity. Streamlined multilateral systems for all genetic resources might avoid costly, duplicative, and ineffective tracking systems and could be linked to intellectual property tools to identify phases of commercial utilization that trigger benefit-sharing obligations. Efforts focused not on the monetary considerations, but on promoting more inclusive innovation and greater equity in biodiversity research and commercialization, and broader public and social benefits from the outcomes of science, are likely to have a greater impact over time.

This is a critical juncture. In the coming year, important meetings will be held in each of the policy forums discussed above, and decisions will be made on DSI and ABS that will have impacts for years to come. In many cases, the implications of these decisions have not been fully explored. In the face of rapid scientific and technological advances, and equally swift and alarming biodiversity loss, it is time to get this right. ■

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