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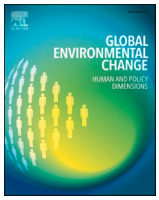

Disruptive data: How access and benefit-sharing discourses structured ideas and decisions during the Convention on Biological Diversity negotiations over digital sequence information from 2016 to 2022

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ABSTRACT

In 2016, negotiations of the Convention on Biological Diversity on access and benefit-sharing policies were shaken up by the emergence of digital sequence information (DSI) as policy issue. Open access to DSI on genetic resources in genetic databases is standard practice in data-driven biological research, but such access was argued to bypass access and benefit-sharing policies of the Convention. As Parties and observers had to take a position on governing DSI, this research investigated the influence of discourses on the negotiations through argumentative discourse analysis. Actors in international environmental negotiations mobilize 'background' discourses – both consciously and unconsciously – to define and 'foreground' issues, which in turn shape negotiation and decision-making processes. The analysis shows that existing discourses on access and benefit-sharing and biodiversity structured actors' statements aimed at defining DSI, thus applying and redefining access and benefit-sharing principles in the context of DSI. Actors with similar and slightly varying interests formed discourse-coalitions on the basis of shared storylines. Developing countries formed a separate discourse-coalition to push for DSI regulation wherein ideas about sustainable development and environmental justice were integrated, and to a lesser extent about biopiracy (the notion that open access to DSI enables the misappropriation of genetic resources and associated traditional knowledge). In response, developed countries adopted narratives put forward by industry and research, advocating that open access to DSI is essential for science, biodiversity conservation and sustainable development. A third coalition, consisting of Indigenous peoples and local communities and civil society, also mobilized environmental justice and biopiracy discourses, but more prominently a unique holistic discourse on nature. Finally, holistic and biopiracy discourses were marginalized in official negotiation documents, while scientific and sustainable development discourses were adopted in official negotiation documents. The research provides a novel understanding of the DSI-negotiations as discursive politics, and highlights how different positionalities in discourses structure and are structured by statements in this political arena.

1. Introduction

The adoption of the Kunming-Montreal Global Biodiversity Framework (GBF) at COP15 in December 2022 signals a new and critical phase for the Convention on Biological Diversity (CBD) and its stakeholders. This holds especially true for providers and users of digital sequence information (DSI), a legally undefined policy term that broadly refers to genetic sequence data and associated digital information. Genetic databases, like GenBank, that form the backbone of modern biological research, rely on the generation of DSI from accessing and sequencing physical genetic material from nature. Aggregated DSI helps researchers to cross-compare genetic traits in and between species to understand evolution better, for example, to identify drought-resistant crop varieties or enzymatic functions for industrial biotechnological processes. DSI found its way to the CBD agenda for the first time at COP13, held in Cancun in 2016. Since then, biodiversity-rich developing countries, civil society and Indigenous peoples and local communities (IPLCs) argued that unregulated DSI poses a risk to achieving the third objective of the CBD on fair access to genetic resources and the fair and equitable sharing of benefits arising from their utilization, given shape through the

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Nagoya Protocol. Developed countries and actors from industry and research strongly opposed the application of bilateral access and benefit-sharing (ABS) policies to DSI use, highlighting the potential hindrance to scientific research and innovation relevant for biodiversity conservation and achievement of the sustainable development goals.

Years-long, tough negotiations in the open-ended working group on DSI (OEWG) finally culminated in the ground-breaking COP15 deal to establish a multilateral system (MLS) specifically for benefit-sharing from the use of DSI, that is also consistent with open data policies. Despite the progress, it is only the start of a long and winding road. Many outstanding issues need to be dealt with before the mechanism is set to launch at COP16 in the fall of 2024, and some persistent divergences mean that Parties to the CBD do not always advance in the right direction. In addition, the CBD has to navigate between other international policy processes on DSI of the Plant Treaty (ITPGRFA), the Pandemic Influenza Preparedness Framework (PIP) and the High Seas Treaty (BBNJ).

Since 2016, a quickly growing, solution-oriented body of literature on DSI has developed with a focus on the CBD, including some recent political, governance and philosophical articles. These range from a detailed overview of the negotiations (Rohden and Scholz, 2022), pathways for harmonized international DSI governance (Qin et al., 2023), and the problematization of DSI for the Nagoya Protocol as an ABS assemblage (Bond and Scott, 2020). The dearth of International Relations research on the DSI negotiations, however, limits our ability to understand what is actually going on behind the scenes of formal negotiations, to whose benefit and at whose expense.

Apart from the technical and regulatory complexity, we argue that it is also challenging for DSI negotiators to find common ground, because of their different worldviews and ideologies. Uncovering them could potentially help negotiators reflect upon their own and understand others' better and thereby contribute to progress in the negotiations. These differences manifest themselves in discursive struggles that are misunderstood or superficially understood when standard political dividing lines in the CBD are viewed at face value. Therefore, a discourse analysis is employed in this paper that draws attention to the "historical, cultural and political context in which a particular account of 'truth' arises'' (Hajer and Versteeg, 2005). 'Critical' international theorists have applied discourse analysis to the CBD negotiations before [but not to DSI] (Dauda and Dierickx, 2013; Lee et al., 2021; Parks, 2018; Suiseeya, 2014). Considering CBD COPs as "social devices subject to orchestration through which institutional and organizational ends can be achieved, legitimized, and contested'' (Campbell et al., 2014), negotiators mobilize discourses to reinterpret the meaning of, for example, principles of fairness and equity, portray other actors in certain ways, and articulate and reject certain governance principles and modalities for DSI. This article therefore researches the 'mobilization of discourses' and their impact on policy-making during the DSI negotiations from COP13 until COP15 from 2016 to 2022. The resulting insights provide a critical perspective of policy-making on emerging technologies like DSI in the CBD, and contribute to growing environmental negotiations scholarship.

Against this background, the article's objective is, first of all, to understand the discursive interactions, struggles and agreements among actors involved in – or affected by – the CBD negotiations on DSI. Moreover, as a second objective, it assesses which discourses have become dominant over others during those negotiations, and have become institutionalized in decision-making on DSI so far. Because the study faces limitations in comprehensively describing the details of the negotiations, readers are recommended to also read one of the aforementioned papers for context.

The structure of the paper is as follows. First, the theoretical and methodological framework based on argumentative discourse analysis (ADA) is elaborated upon (Hajer, 1995). The article then delves into the short history of the CBD and early discourses on biodiversity, ABS and scientific and technological development. Thereafter, the DSI negotiations are covered from 2016 to 2022, supplemented by an in-text analysis of the discourses that were mobilized and their influence on coalition-building and negotiation outcomes, followed by a discussion of possible explanations of them.

2. Theory

Maarten Hajer developed argumentative discourse analysis to examine "what is being said to whom, and in what context'' (Hajer, 1995). He defines discourse as "an ensemble of ideas, concepts and categorisations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities.'' (Hajer, 1995). The method employs four key concepts: *storyline*, *discourse-coalition*, *discourse structuration,* and *discourse institutionalization*.

A storyline is "a condensed sort of narrative that links an event to one or more discourses.''(Hajer, 2009). Storylines create discursive order in debates by making complex issues understandable and by facilitating mutual understanding between actors (Hajer, 2005; 1995, p. 62; (Nielsen, 2014). By re-ordering how issues are understood, storylines drive social change (Hajer, 1995). Storylines form a conceptual tool to investigate how discourses influence the response of policy-makers to environmental issues (Matthews and Marston, 2019). For example, portraying subsistence hunters as poachers enables the criminalization of ordinary people.

Discourse-coalitions are identified when multiple actors in the CBD negotiations 'are bound by the usage of a combination of storylines over time' (Hajer, 2006). Although each actor in a discourse-coalition talks more or less the same language, their political interests may nonetheless differ and they can understand storylines quite differently. Viewed from the perspective of discourse-coalitions, the DSI negotiations constitute a struggle between groups of actors to define the issue of DSI and determine what policy options are more or less correct based on that definition (Dang et al., 2012).

Going forward, discourse structuration occurs when a "social unit'' understands and conceptualizes an issue or the world in line with the tacit rules of discourse that limit what can be said about the issue and which statements are considered truthful (Hajer, 2006; Hajer and Versteeg, 2005). We assume this is the case if a group of actors in the DSI negotiations adopts certain representations of DSI issues to gain legitimacy. Because policy options for DSI governance "emerge from pre-existing situations of discourse structuration'' (Atkinson, 2000), it is impossible to separate the negotiations from discourses that were mobilized earlier in the CBD negotiations, particularly on ABS.

According to Hajer (2006), discourses institutionalize when they are reflected in and reproduced through 'institutional arrangements'. The frame we apply to analyse the DSI negotiations is based on an examination of the policy direction and options as well as of concepts and their interpretations in official negotiation documents.

3. Material and methods

Each discourse analysis is interpretative in nature, and therefore highly intersubjective (*inter-*, because many more subjects than the researcher only were involved in the result-making). Positivist criticism of the lack of objectivity in discourse analysis fails to consider that interpretative policy analysis claims neither objectivity nor universality. However, to account for the lack of transparency about methodological processes underlying the interpretative findings in some discourse analyses (Greckhamer and Cilesiz, 2014), we now make clear which steps we have taken.

Hajer offers a methodological toolbox, consisting of ten steps, to execute argumentative discourse analysis (see Fig. 1). These steps were also followed through in the research underlying this paper. The ten steps include data collection (steps 1 – 4), data analysis (steps 5–9), and result verification (step 10).

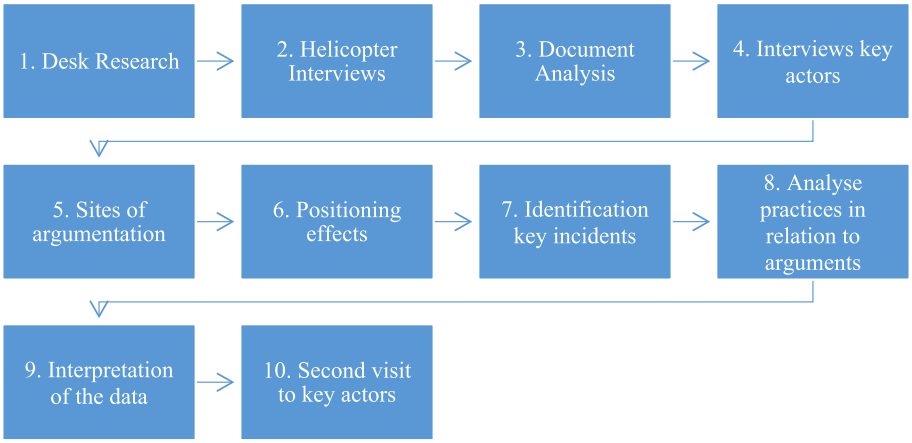

Fig. 1. Methodological steps for doing argumentative discourse analysis (Hajer, 2006).

For data collection, the research applied data and method triangulation by combining document analysis, online and in-person interviews and observations of the negotiations (Fig. 2). Data triangulation helps to analyse how meaning is constructed through written and verbal statements (Waitt, 2005). At the start, desk literature research was conducted to identify 'pre-DSI' but related discourses that were already described before 2016. We interpret these 'background discourses' as colours of an underpainting whereupon DSI storylines, akin to brushstrokes, mobilize discourses individually or combinations thereof to 'foreground' and reshape features of the painting. The documents of interest for the assessment of discourse structuration are the Earth Negotiations Bulletin reports on the CBD that are published by the International Institute for Sustainable Development (IISD), actors' views on DSI that were submitted in between COPs on the CBD website (https://www.cbd.int/dsi-gr), online statements and policy briefs by actors, and media articles on DSI. To understand the degrees of discourse institutionalization, and therefore which discourses gain legitimacy in policy options, we analyse how bracketed text in so-called non-papers and conference room papers (CRPs) developed into cleaned texts in limited distribution documents (L-docs) as recommendations to the COP, and associated COP decisions with binding effect.

Twenty-eight interviews (nine online and nineteen in-person) were conducted over a year, starting a month before the OEWG-3 negotiations in Geneva in March 2022 and ending four months after COP15 held in Montreal in December 2022. Interviewees were approached through a mix of purposive and snowball sampling to interview at least two actors from each of five major negotiation blocs (African Group, Asia and Pacific Group, European Union (EU), Group of Latin America and the Caribbean (GRULAC), and JUSCANZ, an informal negotiation bloc with Japan, US as non-Party, Canada, Australia, New Zealand and others) and from four observer groups (civil society, IPLCs, industry, and research and academia) most active in the DSI negotiations (youth and the Women's Caucus only became actively engaged with DSI after the research period), while remaining cognizant of nuanced differences between Parties in negotiations blocs and between individual actors in these separate categories. Informed consent was obtained from interviewees before recording and transcribing the interviews.

Plenary and contact group sessions of the OEWG-3 and COP15 negotiations on DSI were attended in-person to track the progress of the negotiations and link statements to actor groups. Note sharing and corridor talks with negotiators and other researchers helped to maintain an overview of the dynamic negotiations.

For data analysis, an iterative process of open and axial coding of interview transcripts, statements and submissions, and of negotiation reports and documents was executed. While doing so, statements were grouped under four analytical categories:

1) the way actors interpret the value of DSI and genetic resources;
2) the way the roles of innovation and knowledge in relation to biodiversity conservation and its sustainable use are valued by actors;
3) the way actors justify or reject regulation of access to DSI;
4) the way actors justify or reject benefit-sharing regulation for DSI use.

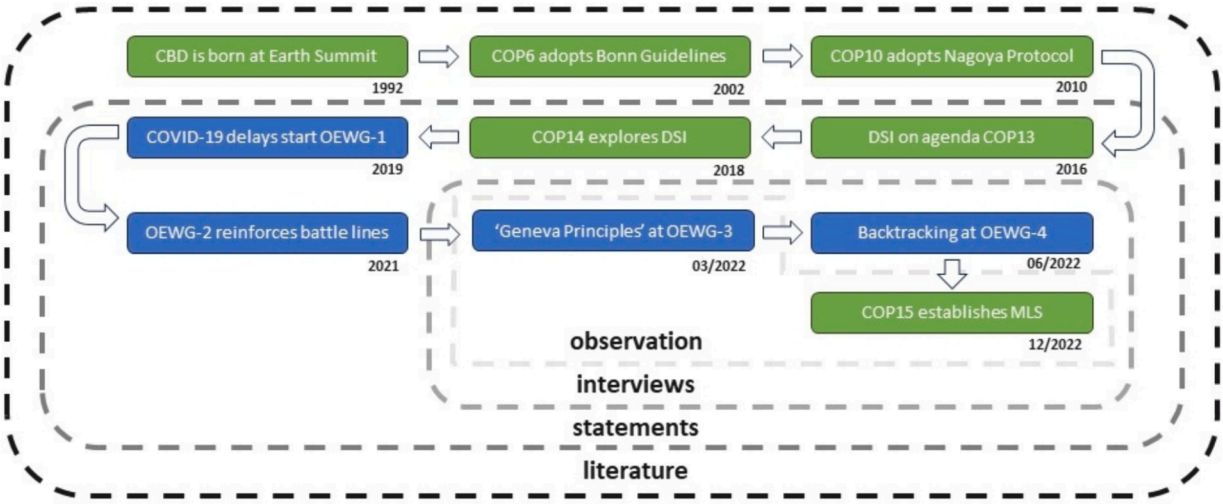

Fig. 2. Overview of negotiations and data types.

In a next step, recurring themes and their connections under those four categories were noted down to identify concept storylines. These were subsequently refined through a new round of interviews and text readings in an iterative manner, and then linked to actors' statements to identify the formation of discourse-coalitions and study the process of discourse structuration. Finally, every negotiation session's negotiation documents were assessed to evaluate discourse institutionalization. To do so, it was checked which discourses and/or storylines were (most) represented in policy and decision texts, and which were not (or less so). To understand such discourse institutionalization, we follow (Buijs et al., 2014) who claim that the discourses that will 'survive' in policy- and decision-making are those that are: 1. (most) existential, credible and timely, 2. (most) supported by powerful and authoritative actors, and 3. (best) alternatives to current 'discourses-under-pressure' (or even 'discourses-in-crises').

The final step (step 10) of revisiting key actors is important because tacit rules of discourses become apparent to subjects who mobilize them when they are pointed out by researchers (Hajer, 2006). Identified discourses, storylines and coalitions were presented to and discussed for feedback with key actors at the Academia and Research Hub of Place Québec, a conference room at COP15, on the 10th of December 2022.

4. Results

The first sub-section describes five background discourses the terminologies of which have been used before by other discourse analysts in relation to ABS or the CBD, with the exception of the holistic discourse. This section is followed by a short history of DSI's entry onto the CBD agenda in 2016. Subsequently, the identified storylines are presented with two exemplary quotes and linked to the discourses that they mobilize. Throughout these sub-sections, actors are introduced that are the 'carriers' of those storylines and conceptualized as discourse-coalitions in the fourth sub-section. The results section ends with a lengthy analysis of discourse structuration and institutionalization in the negotiations leading up to the COP15 deal on DSI.

4.1. Background discourses

4.1.1. Scientific discourse

The biodiversity concept dates back to the 1980 s when the alarming loss of natural areas and species led to the formation of conservation biology as a separate scientific discipline. This is a value-laden 'crisis discipline' wherein scientists hold strong environmental and ethical norms to take action in the face of uncertainty (Barry and Oelschlaeger, 1996). Conservation biologists gradually started using 'biodiversity' as a ''scientized synonym for nature'' (Takacs, 1996, as cited in Väliverronen, 1998). The CBD adopted the term and defined it as ''diversity within species, between species, and of ecosystems'' (United Nations Environment Programme, 1992). The broadness of this definition allows interpretations to match plurality in values and positions, opening up space for different 'biodiversity discourses' (Gustafsson, 2013). By itself, the term reorders our relationship with nature by constructing it as a research object and separating it from society (Escobar, 1998; Turnhout et al., 2013). Herndl and Brown (1996) designate this view of nature as *scientific discourse.* In our interpretation, this discourse values species, including genetic resources, as scientific research objects and justifies their conservation without knowing the exact implications of their loss.

4.1.2. Sustainable development discourse

In the preparation of the CBD, the scope of the convention was extended to incorporate concerns of economic development and scientific progress (Glowka et al., 1994; Sanchez, 1994). The CBD established countries' sovereignty over genetic resources to counter the historically extractive pattern between developed and developing countries. Back then, access and benefit-sharing was posited as a 'win-win' policy. While developed countries would gain more harmonized access to genetic resources under the condition of respecting the sovereignty of developing countries, the latter would be incentivized to conserve and sustainably use biodiversity in return for monetary and non-monetary benefits. This compromise, the so-called 'Grand Bargain', reflects the *sustainable development discourse* that was widely present throughout the Rio Earth Summit where the CBD was negotiated and adopted (Reid, 1993; Ten Kate and Laird, 2000; Widenhorn, 2013). ABS is a typical sustainable development instrument that combines economic development, conservation and social equity in the 'sustainability triangle' (Rechkemmer, 2006). But not all actors were equally on board. Civil society and some delegations criticized the commodification of nature that ABS would facilitate. Its economic-reductionist and utilitarian values are reflected in representations of genetic resources as 'green gold', 'assets' and 'tradable commodities with isolated genetic traits' (Svarstad, 2004; Gustafsson, 2013; McAfee, 2003).

4.1.3. Biopiracy discourse

The *biopiracy discourse* rivals the win–win narrative on ABS and criticizes the neo-colonial and neoliberal dynamic wherein large companies from the Global North commercialize and monopolize genetic resources and associated traditional knowledge from the South without consultation or compensation. In a more radical form, it rejects bioprospecting agreements in principle for instrumentalizing nature and IPLCs (Svarstad, 2004). 'Biopiracy' is an accusatory metaphor that vilifies powerful actors as illegitimate appropriators of genetic resources and glorifies both victims of and opponents to these practices, like IPLCs and activists (Adger et al., 2001). Sometimes, negotiators use the less divisive term 'misappropriation' to denote biopiracy (Robinson, 2014). At COP5 in 2000, the Coalition Against Biopiracy, a civil society collective including the ETC Group, staged the first edition of the Captain Hook Awards for Biopiracy in the COP premises to name and shame wrongdoers and celebrate those who resist biopiracy with the help of theatrics and drawings of 'biopirates'. The discourse is also mobilized by governments, for example at COP10, where developing countries called for eliminating biopiracy (International Institute for Sustainable Development, 2010), while the African Group argued that there was a ''moral obligation'' to apply the Nagoya Protocol retroactively to cover misappropriated genetic resources in the colonial past (Kohsaka, 2012; International Institute for Sustainable Development, 2010).

4.1.4. Holistic discourse

Since the founding of the Working Group on Indigenous Populations at the UN in 1982, indigenous peoples are increasingly recognized and organized as independent actors in international negotiations (Sanders, 1989). The Indigenous rights movement is not only aimed at securing the self-determination of Indigenous peoples over land, knowledge and genetic resources, but also at preserving Indigenous worldviews of nature as 'Mother Earth' wherein humans and nature co-shape one another in a spiritual and reciprocal relationship. At the international level, Ecuador and Bolivia are major advocates of recognizing the rights of Mother Earth (Espinosa, 2014). This philosophical perspective contrasts with the human-nature dichotomy in Western society which is reflected in the scientific and sustainable development discourses. These biocentric views of and relational values towards nature are categorized by Schleiffer et al. (2023) under *holistic discourse*. The 'ethic of stewardship of biodiversity' that characterizes this relationship with nature underlies Indigenous biocultural rights in Articles 8(j) and 10(c) of the CBD (Anquet & Girard, 2022).

4.1.5. Environmental justice discourse

The environmental justice movement, which originated as protests in the United States against correlations between social injustices and the distribution of toxic waste, has since expanded to deal with a wide variety of issues (Schlosberg, 2013). Environmental justice is generally interpreted as tri-dimensional, and deals with (1) the fair allocation of

resources, opportunities and burdens (distributive justice), (2) fairness in decision-making (procedural justice), and (3) recognition of values, rights and worldviews (recognitional justice). In the context of biodiversity conservation, *environmental justice discourse* refers to the political and moral obligations arising from these injustices (Schleiffer et al., 2023). The discourse overlaps in some aspects with other aforementioned discourses, for example, by promoting 'just' sustainable development (Agyeman, 2020), Indigenous rights (Schlosberg, 2013), and decolonization.

4.2. Digital disruption of ABS regulation

Soon after the CBD entered into force, trade-offs and mismatches of expectations among Parties appeared. Parties decided in 2002 to work towards the establishment of a binding ABS protocol to address issues like legal uncertainty and the tension between strong protection of intellectual property rights and benefit-sharing obligations like technology transfer (Rosendal, 2006). This first-of-its-kind piece of ABS legislation was adopted in 2010 at COP10 in Nagoya, Japan, as the Nagoya Protocol.

Despite this accomplishment, overlooking the impact of synthetic biology on ABS would later prove a crucial mistake, even though the issue was already acknowledged in 2000 in an article by Ten Kate and Laird. Also, in 2007, the ETC Group (2007) describes in a report section, titled "Star-Trek Biopiracy: New Pathways for Bio-Burglars?", how access to digital, dematerialized and delocalised information on genetic resources formed a regulatory loophole to ABS obligations. An interviewed insider recalls that negotiators at COP10 were aware of the issue but chose to ignore it for the time being. During negotiations of the CBD's Subsidiary Body on Scientific and Technological Advice (SBSTTA) on synthetic biology in May 2016, the implications of 'digital sequence information' were first discussed. Based on this report, developing countries requested a few months later at COP13 to establish a separate working group on DSI. This COP revolved around two questions that provided the first avenue for discursive struggles: if DSI falls under the scope of the CBD, and if so, how it should be regulated?

4.3. Identified storylines

Throughout the six-year period from COP13 until COP15, five storylines unique to the DSI negotiations were identified (see methodology section). They are named, in short, the *sequencing nature*, *bio-innovation*, *sustainable bioeconomy*, *stewards*, and *digital biopiracy* storylines. All of those built more or less on the 'background' discourses, as elucidated in the above, but also gave their own twist to those. Although, these storylines also contain comparable and overlapping elements.

4.3.1. Sequencing nature to save it

> "[The League of European Research Universities (LERU)] strongly believes that DSI should not fall under the scope of the Nagoya Protocol. In LERU's view the benefits to biodiversity and conservation research worldwide and society at large, from unhindered open access to DSI, far outweigh any (financial) benefits which providers could gain from restricting access." (online statement by League of European Research Universities (2018))
>
> "The sequencing community's tradition of open sharing has immeasurable benefits for research, biodiversity conservation and the bio-economy, and is a central part of the growing open science movement." (submission on DSI by the DSI Scientific Network, 2022)

The presentation of biodiversity sequencing as an 'urgent endeavor' (Delgado, 2021), and the use of phrases to describe sequencing projects like "sequencing life for the future of life" (Lewin et al., 2018), and "digital Noah's Ark" (Wei et al., 2022), positions biodiversity genomics as a crisis discipline (Chan, 2008). In other words, rapid and unhindered access to DSI is deemed essential to alleviate the biodiversity crisis. Lending from (McAfee, 1999) famous article's title "Selling nature to save it", this storyline is therefore called *sequencing nature to save it*. The storyline mobilizes the scientific discourse in the sense that a linear relationship is perceived between the production of knowledge and its use for conservation (Turnhout et al., 2013). The storyline portrays the advantages of open access to DSI databases as non-monetary benefits, for example, open-access publications, scientific collaborations, and the use of DSI in biodiversity monitoring and invasive species management. The storyline draws attention to scientific capacity deficits in developing countries that need to be addressed for them to generate, access and benefit from DSI. Then, the logic goes, developing countries can participate in biodiversity sequencing and research on an equal footing with the rest of the world.

4.3.2. Stimulating bio-innovation for social progress

> "[open access to DSI is essential to] unlock the value of physical genetic resources, by enabling the sustainable use and hence supporting the valorisation and thus conservation of biodiversity" (submission on DSI by the International Chamber of Commerce, 2019)
>
> "If you have invested a lot in acquiring genetic resources and are smart enough to develop something from them, why should you still have to share benefits with the 'owner'? You know, it is really up to you if you build a wooden cabin or a million-dollar home using someone's timber that you bought for a fair price." (interviewee from industry, online, 2022)

In this storyline, the use of DSI is less about saving species and more about capturing economic value in bio-innovation. The *bio-innovation storyline* mobilizes sustainable development discourse by referring to the societal benefits of open and unregulated access to DSI, including the development of sustainable technologies that decrease pressure on biodiversity. According to its proponents, malfunctioning ABS systems prevent the sustainable use of genetic resources and thereby cause their deterioration. Herein, we find the economic-reductionist representation of genetic resources. As exemplified by the second quotation, the storyline supports libertarian science and technology policies that strengthen intellectual property rights to stimulate and reward costly investments in genetic resources. Taxation of DSI-derived benefits is therefore considered unfair because it violates intellectual property rights (Cozzens, 2007).

4.3.3. Benefit-sharing from DSI for sustainable bioeconomies

> "[Access and benefit-sharing] allows the rational economic exploitation of biodiversity to finance its conservation and sustainable use" (submission on DSI by government of Brazil, 2019)
>
> "The use of genetic resources can decrease poverty and support a knowledge-driven bio-economy in Africa. Capacity-building to use DSI is one part of the solution, but we also need monetary resources to halt biodiversity loss." (interviewee from the African Group, Geneva, 2022)

Because large conservation responsibilities are placed on biodiverse developing countries under the GBF, like the commitment to conserve thirty percent of land and sea surface by 2030, they seek adequate financial compensation from DSI that originates in their jurisdiction. The storyline presents the Global South as the main provider of genetic resources and DSI on genetic resources to the Global North. Many governments also have strategic agendas for building sustainable bioeconomies that rely heavily on the utilization of biodiversity. For example, narratives of the Colombian bioeconomy portray the valorisation of the nation's 'biodiversity' as a driver of a desirable future (Aparicio, 2022). At a regional level, the Amazon Bank of Codes and

African BioGenome Project also expect large economic sums from DSI utilization. The *sustainable bioeconomy storyline* strongly features utilitarian elements of the sustainable development discourse and presents, in contrast to the bio-innovation storyline, benefit-sharing from the use of DSI as a win–win policy for biodiversity conservation, bio-innovation and scientific development. Instead of questioning the premises that ABS is based upon, the 'DSI loophole' is regarded as the culprit of a financially underperforming Nagoya Protocol. Thus, the initial expectations for ABS in the 1990s are reapplied in the context of new technological developments.

4.3.4. Reward the stewards of DSI on genetic resources

> "Hereditary material is sacred to us. It is alive with the lifeforce, life essence or living spirit that connects all living things to a living cosmos and Mother Earth. Life essence infuses all beings and entities, human and non-human, in a web of interconnected relationships. The life essence infusing genetic material is understood as forms of kinship rather than merely inert sequences of crystalline amino acid monomers found in DNA and RNA. This spiritual and reciprocal relationship enables biological and genetic diversity to thrive in our lands, territories and waters. Without this guardianship, we would not have the diversity of life that is the source of genetic resources and genetic sequence data.'' (statement on DSI by the International Indigenous Forum on Biodiversity, 2021)
>
> "If DSI is not addressed in the global biodiversity framework, IPLCs will lose all their benefits from genetic resources, their lands and culture, and they will go to the cities. We have to increase benefits [from DSI] because IPLCs need money to protect species.'' (interviewee from the Asia and Pacific Group, Geneva, 2022)

This storyline mobilizes holistic and environmental justice discourses by stating the need to promote Indigenous values in a policy outcome for DSI. The first statement contradicts the mere scientific and economic valuation of DSI, shows the reliance of research and development upon traditional knowledge and reflects a struggle for recognitional justice. Furthermore, the storyline fits broadly in the Indigenous Data Sovereignty movement which seeks to protect Indigenous rights in digital systems and to guard against extractive data practices, including in conservation genetics (Robbins et al., 2023). Various initiatives and tools are proposed to uphold these rights, such as the CARE principles for Indigenous data governance and Indigenous metadata labels (Golan et al., 2022; Mc Cartney et al., 2022). On the other hand, the *stewards storyline* is not only articulated by IPLCs. Governments justify benefit-sharing from DSI for IPLCs as an economic incentive because of the key role IPLCs fulfil in biodiversity conservation. This position, that is best described by utilitarian morality (Schleiffer et al., 2023), is not aligned with IPLCs per se since they require no external incentives for conservation (Svarstad, 2004). It is therefore important to categorize such statements *on* IPLCs as mobilizations of sustainable development discourse.

4.3.5. Stop the digital biopirates!

> "This award ceremony came as high-tech 'digital' biopiracy is becoming easier than ever. With the accelerating tools of genome-editing and synthetic biology, today's biopirates no longer need to carry their booty offshore in boats and airplanes – they can swiftly upload DNA as digital sequences in one location and then recreate it as synthetic DNA on the other side of the planet. As the CBD meets to discuss what to do about Synthetic Biology it's high time to take on the new cyberthieves of the biodiversity commons.'' (online statement of SynBioWatch on Captain Hook Awards, 2016).
>
> "In access and benefit-sharing issues, the developed world takes the lion's share while the developing world fights for a small return. Greater responsibilities are being placed on the latter to conserve biodiversity, but without the means to do so. That is genetic colonialism.'' (interviewee from GRULAC, online, 2022)

Echoing past biopiracy sentiments, the *digital biopiracy storyline* vilifies generators, providers and users of digital DNA data, suggesting that current practices are a continuation of bioprospecting controversies in digital format that continue to harm IPLCs and developing countries. The storyline further highlights the digital divide which is partially attributed to the sequencing of colonial gene banks, thereby mobilizing the decolonization element of biopiracy discourse. As a metaphor for describing unregulated and harmful research practices, the concept of 'digital biopiracy' also performs as a *boundary object* with 'connective' and 'communicative' functions (Väliverronen, 1998). Boundary objects are multi-interpretable concepts and ideas that fit different meanings and needs in various "social words'' while still being easily recognizable and maintaining a "common identity'' across them (Star & Griesemer, 1989). Digital biopiracy is thus utilized in highly varying UN negotiations over ABS to challenge similar patterns of misappropriation and monopolization of human, terrestrial, and marine genetic resources through technological means. The communicative aspect of the digital biopiracy metaphor becomes apparent through its frequent use in media articles and literature to describe the challenges DSI poses to ABS (Nehring, 2022), thereby functioning as an 'emblematic issue' for governance issues (Hajer, 2006).

4.4. Emerging discourse-coalitions

In the analysis, three separate discourse-coalitions were identified. These are presented with partaking actors and the relevant set of storylines and background discourses in Table 1. Their characteristics and key moments in the DSI negotiations are shortly summarized here before we delve into their roles and interactions in the negotiations.

The first consists of the bloc of developing countries, sometimes referred to as the Group of 77 (G77), that raised the issue of DSI at COP13. It is composed of the African Group, the Asia and Pacific Group and GRULAC. This bloc justified regulation by positioning the Global South as a haven of biodiversity and as an involuntary lagger in DSI-based biological research. This currently extractive pattern that is, according to them, neo-colonial in nature, could be alleviated by sharing benefits from DSI in order to support sustainable bio-economies. Civil society, represented mainly by the Third World Network and the ETC Group, plays a minor role in this coalition.

In opposition to this *pro-regulation discourse-coalition*, a coalition of the EU, JUSCANZ, research and academia and industry emerged in response. At COP13, actors in this coalition were caught by surprise of the prospect of DSI regulation. As attempts to keep DSI out of the scope of the CBD negotiations failed, the *pro-innovation discourse-coalition* started to paint a positive picture of free, open and unhindered access to DSI for society, scientific research, biodiversity conservation and its sustainable use, and development of sustainable technologies. When regulation of DSI seemed inevitable over time, the coalition worked towards getting a compromise on most favourable terms.

A third discourse-coalition that centres around Indigenous rights emerged later than the other two. It consists of the International Indigenous Forum on Biodiversity (IIFB), the Third World Network, and the plurinational State of Bolivia, known for its activism for the rights of Mother Earth. The *pro-Indigenous rights discourse coalition* mainly articulated the stewards storyline, followed by the digital biopiracy storyline.

Having discussed the discourses, storylines and discourse-coalitions, we now proceed to relate them to the various stages and topics of the DSI negotiations in order to assess the processes of discourse structuration and institutionalization.

Table 1
Overview discourse coalitions as adapted from Takahashi and Meisner (2012), categorized along four analytical categories.

Pro-regulation discourse coalition (African Group, GRULAC, Asia Pacific Group, civil society)
Storylines: sustainable bioeconomy (primary), digital biopiracy (secondary)
- Genetic resources and DSI:
  are valuable scientific and economic resources under the sovereignty of countries.
- Innovation and knowledge:
  are reliant on biodiversity in Global South that is left behind in digital development.
- Access regulation:
  has to be investigated for DSI to stop the misappropriation of national resources.
- Benefit-sharing regulation:
  supports sustainable bioeconomies and conservation burdens in Global South.

sustainable development discourse; environmental justice discourse; biopiracy discourse

Pro-innovation discourse coalition (EU and JUSCANZ, research and academia, industry)
Storylines: sequencing nature and bio-innovation (primary)
- Genetic resources and DSI:
  are valuable scientific and economic resources if shared as open and free as possible.
- Innovation and knowledge:
  are best supported through open data and capacity-building in developing countries.
- Access regulation:
  in any form will harm science, biodiversity conservation and innovation globally.
- Benefit-sharing regulation:
  has to be decoupled from access regulation to guarentee open access and to consider sharing of DSI and its applications as non-monetary benefits.

sustainable development discourse; scientific discourse

Pro-Indigenous rights discourse coalition (IIFB and civil society)
Storylines: stewards (primary), digital biopiracy (secondary)
- Genetic resources and DSI:
  form part of sacred bond between humans and nature.
- Innovation and knowledge:
  build on traditional knowledge and IPLCs' sustainable use of genetic resources.
- Access regulation:
  is necessary to ensure rights of IPLCs over genetic resources and Indigenous data.
- Benefit-sharing regulation:
  helps IPLCs to access funds and tools to protect their lands and engage in science.

holistic discourse; sustainable development discourse; environmental justice discourse

4.5. Discourse structuration and institutionalization

4.5.1. COP13 and intersessional period (2016–2017)

When DSI was put on the COP13 agenda, all actors went back to the drawing board to assess their position on DSI. Shortly after the COP, the CBD Secretariat invited actors to submit views on the potential implications of DSI for the three objectives of the CBD. During this initial positioning, emerging discourse-coalitions became visible.

Actors from the pro-innovation discourse coalition gave in their submissions many examples of benefits that open access to DSI provides for the achievement of all three CBD objectives. Open access data repositories were portrayed as non-monetary benefits by the United States, for example, while EuroSeeds argued that regulation would 'hinder innovation benefiting resource-poor farmers'. DivSeek, previously accused as 'digital biopirate' at the COP13 Captain Hook Awards, mentioned capacity-building initiatives that address the 'digital divide'. The best way to protect biodiversity, it follows, is *not* by restricting DSI access but by tackling the capacity deficits in developing countries.

On the other hand, the pro-regulation discourse coalition highlighted the risk of unregulated DSI to bypass the third objective of the CBD, with possible negative impacts on efforts to achieve the first and second objective. Without financial, scientific and technological support through ABS mechanisms, it was argued that developing countries cannot effectively conserve and sustainably use their biodiversity. The African Group called for the redistribution of technologies that "hold substantial promise of boosting the transition to a green economy and hastening the universal achievement of truly sustainable global development". The digital biopiracy storyline was articulated by Brazil that argued that patent applications should disclose the geographic origin of underlying DSI to "inhibit misappropriation", and by the African Center for Biodiversity which took aim at "the existing global oligopoly built on a cartel-like technological platform in biotechnology traits" of large chemical and seed corporates.

From the available data it seems that the pro-Indigenous rights discourse coalition had not emerged at this stage yet. The IIFB as the leading organization for IPLCs did not submit its view and Indigenous rights played a minor role in other submissions.

4.5.2. COP14 and intersessional period (2018–2021)

During the SBSTTA-22 negotiations before COP14 in 2018, the scientific and societal benefits of the use and public access to DSI were recognized in negotiation documents, as well as the need for capacity-building. Besides, fair and equitable benefit-sharing from DSI was considered an economic incentive for IPLCs to conserve and sustainably use biodiversity. These largely bracketed texts highlighted the early structuration of scientific and sustainable development discourses through the sequencing nature, bio-innovation and sustainable bioeconomy storylines in the CBD negotiations on DSI.

At COP14, the EU and JUSCANZ portrayed open access to DSI as beneficial to the global community and in itself as a form of benefit-sharing. The G77 and IIFB stressed that DSI was in the scope of the CBD (International Institute for Sustainable Development, 2014). The COP14 decision adopted most of the SBSTTA-22 texts, except for a statement on 'benefit-sharing as incentives for IPLCs' and calls for the identification of capacity needs.

In the next intersessional period between 2019 and 2021, actors were again invited to submit their views on outstanding issues. By and large, the submissions repeat earlier positions and claims. Some JUSCANZ Parties and industry actors still rejected the idea that DSI was under the scope of the CBD. A large group of public and private users of DSI requested Parties to acknowledge the benefits of open access to DSI and warned explicitly against the risks of restrictions for biodiversity conservation, and instead recommended Parties to invest in capacity-building and global scientific collaboration. Although capacity-

building was also requested by developing countries, they regarded it as an additional measure to monetary benefit-sharing. Madagascar again represented the Global South as 'provider' of DSI by stating that 'mega-adiverse supplier countries' should be prioritized for capacity-building projects. Mexico was the first Party to provide details on how IPLCs conserve genetic resources. Notably, the IIFB was again absent from the submission list, potentially because of overstretched negotiation capacity.

After delays from the COVID-19 pandemic, the OEWG reconvened online in August 2021. The OEWG-2 negotiation documents reinforced earlier normative assumptions: DSI use is indeed considered valuable to (non–)commercial research, any solution should not hinder R&D, and access should be free and open. On the other hand, new texts were introduced that called for fair and equitable benefit-sharing from DSI use and for the closing of the 'digital divide'. Intriguingly, one sentence stated that capacity deficits cause an 'unfair and inequitable distribution of benefits of open access'. This statement mobilizes the distributive dimension of environmental justice discourse. Some references to the 'pivotal role' of IPLCs in conservation, to rights-based approaches and to the rights of Mother Earth indicated articulations of the stewards storyline and the emergence of the Indigenous rights discourse-coalition.

4.5.3. A COP15 deal in sight (2022)

During the OEWG-3 negotiations in March 2022, the need for compromise and for 'cleaning' texts became really pressing as COP15 was nearing fast. Several policy options to regulate DSI were up for debate, ranging from the maintenance of the status quo, variations on bilateral ABS models, payment for database access, scientific and technical cooperation, and inapplicability of ABS regulation to DSI.

As the negotiations soon came to a standstill, negotiators continued working in a smaller Friends of the Chair (FoC) group, which works through personal invitation by the chair and excludes observer groups. The night before the final plenary session, the FoC agreed on the so-called 'Geneva Principles' in a relatively 'cleaned' conference room paper, stating that any policy outcome on DSI should (be):

- "efficient, feasible and practical;
- generate more benefits, including both monetary and non-monetary, than costs;
- be effective; provide certainty and legal clarity for providers and users of DSI on genetic resources;
- not hinder research and innovation;
- be consistent with open access to data;
- not be incompatible with international legal obligations;
- be mutually supportive of other ABS instruments;
- take into account the rights of IPLCs, including with respect to the traditional knowledge associated with genetic resources that they hold.''

The document also contains a proposal for the establishment of a multilateral benefit-sharing mechanism from DSI. Notably, text proposals from an earlier non-paper on 'bioeconomy-based sustainable development' and on the recognition of 'Mother Earth and sacredness of hereditary material for IPLCs' were removed. Therefrom, it seems that the sustainable bio-economy storyline was considered less convincing than the sequencing nature and bio-innovation storylines which both were articulated strongly in the new conference room paper. It also became apparent that texts that mobilize holistic discourse were not credible to Parties. The digital biopiracy storyline was also omitted from the conference room paper. In another negotiation session on the GBF text, an attempt by Bolivia to include texts on 'countering biopiracy' and promoting the rights of Mother Earth in Target 5 on the use of wild species failed, illustrating a more broader marginalization of biopiracy and holistic discourses in the Geneva negotiations. One possible explanation can be that Bolivia was not in the FoC. When the conference room paper was under review of the plenary session during the last day of the negotiations, Bolivia resisted that open access was to be understood as 'free of charge' (International Institute for Sustainable Development, 2022). A small group of negotiators gathered in a 'huddle' and solved the conflict by including an alternative phrasing that open access "does not mean free and unrestricted access''.

During the OEWG-4 negotiations in June, Parties continued the constructive path they set in at OEWG-3. Still, major issues of contention were the relationship between the potential overlap of a multilateral benefit-sharing mechanism for DSI and a bilateral national legislation for genetic resources (hybrid regime), the issue of tracking and tracing the origins of DSI, the African Group's proposal for a levy tax of one percent on the retail price of DSI-derived products, and what 'open access data' actually means. The debate between the pro-innovation and pro-regulation discourse-coalitions over the benefits of open data is exemplified by a bracketed text suggestion stating that "open data in itself is not a means to ensure benefit-sharing''. This interaction reflects how the pro-innovation discourse coalition successfully narrowed down parts of the debate to a redefinition of benefit-sharing in terms of non-monetary benefits from DSI.

Due to the compromises already made in Geneva, DSI could progress faster than other topics of the GBF at COP15. Still, Parties soon continued to negotiate in the FoC group to resolve divergences, meaning it was hard to gain information as an observer. The COP decisions, including the one on DSI, were subsequently finalised rather hurriedly in closed ministerial segments at the end. The decision on DSI established a multilateral mechanism along the lines of the aforementioned 'Geneva principles', and recognized that open access to DSI as well as fair and equitable benefit-sharing from its use are important elements to realize all three objectives to the CBD. The decision strongly emphasizes capacity-building for generation, access to and use of DSI. The rights of IPLCs were also taken into account and they are recognized as beneficiaries of funding for projects contributing to the conservation and sustainable use of biodiversity, although a text on their 'role as stewards of biodiversity' was ultimately removed and other texts from earlier negotiations reflecting Indigenous worldviews are absent. This could suggest that the utilitarian element of the stewards storyline was pushed by Parties while the recognitional justice element is deliberately left out (see 4.3.4.). Lastly, Parties agreed on the role of benefit-sharing from DSI in broader financial resource mobilization strategies, highlighting the sustainable bioeconomy storyline.

5. Discussion

While the CBD has a lot on its hands before the multilateral benefit-sharing mechanism is set to launch at COP16 in 2024, the agreement on DSI is undoubtedly a major negotiating achievement by all involved. So, what is the influence of discourses on this outcome? We start answering this question by focusing on the storylines.

The unclarity in the beginning allowed Parties and observer groups to represent genetic resources, DSI, innovation and knowledge in ways that justified or rejected certain policy options for access and benefit-sharing. It soon became clear that DSI challenged the at that time prevailing ABS-discourses and −rules in the context of the CBD and the Nagoya protocol. Through the articulation of storylines, new meanings were thus given to the objectives of the CBD, for example by defining open access data as non-monetary benefits, or the digital divide as unfair and inequitable benefit-sharing. All identified storylines seemed credible and coherent in their own right, but garnered various degrees of support in various audiences and at various stages of the DSI negotiations.

The scientific and sustainable development discourses underlying the sequencing nature, bio-innovation and sustainable bioeconomy storylines allowed mutual understanding of DSI between the pro-regulation and pro-innovation discourse-coalitions. Both coalitions value DSI as an economic and scientific resource for sustainable

development and scientific progress. Thus, the widespread agreement on capacity-building can be easily understood, because this measure is consistent with both open data and stricter regulation of DSI. The institutionalization of scientific and sustainable development discourses in the decision on DSI may bolster associated storylines in other negotiations over scientific capacity-building, knowledge and technology transfer. Interestingly, research, academia and industry became part of the same discourse-coalition in the DSI negotiations while in other negotiations they more often clash, for example, in the negotiations over deep sea bed mining.

The reductionist vision on life and its commodification that the holistic and biopiracy discourses challenge is, however, not questioned in the outcome for DSI. This could potentially be explained by the phenomenon of civil society actors choosing a milder tone to align their norms with state actors that make the final decisions (Suiseeya, 2014). Digital biopiracy resonated well with civil society, IPLCs and the media, and functioned effectively to put and keep DSI on the agenda, but failed to be included in any official documents. Its explicitly divisive character gives biopiracy its communicative and connective power, but makes it not very constructive for compromising (Castree, 2003).

We attribute these outcome to the following five factors. First of all, the UN rule and voting system favours state actors as the only legitimate and authoritative decision-makers. Views of observer groups may be adopted, but as easily dismissed. Secondly, the need for compromising and the practice of hastened deal-making near the end of COPs make the adoption of competing worldviews, like those of the IPLCs, and of divisive constructs, such as biopiracy, highly unlikely. Considering the decision on DSI as part of the GBF's package deal, the ABS-specific focus of the biopiracy discourse also makes it more vulnerable to becoming crowded out in collective decision-making. Such decisions are more likely to be shaped by less specific discourses that can be mobilized in multiple negotiations, such as sustainable development discourse. These two reasons relate to the substantive dimension of inclusiveness in decision-making, that is whether inclusive procedures produce inclusive outcomes (Díaz-Reviriego et al., 2019). Although participatory processes for IPLCs have been strengthened, looking more broadly at the GBF, the normative shift implied in the holistic discourse were neither reflected in the negotiation outcomes of other targets (Parks & Tsioumani, 2023). On the other hand, the strongly contested inclusion of Mother Earth in section A of the GBF is described by Hall (2023) as a 'Trojan Horse' that can challenge the dominant nature ontologies of the CBD in the long term. Thirdly, because the CBD and Nagoya Protocol texts originate from 'background' ABS discourses, namely the scientific, sustainable development and environmental justice discourses, discussions over related concepts in the DSI negotiations automatically mobilize these discourses, while policy options have to correspond with them. Note again that biopiracy was only coined *after* the adoption of the CBD. And with regard to the holistic discourse, non-Western nature values only recently gained traction in international policy processes (e.g. IPBES Values Assessment). Revisiting the painting analogy, storylines corresponding with the dominant 'discursive colors' are thus easier to add as new layers to the canvas. Conversely, actors who articulate storylines that mobilize more recent discourses are limited in drawing new lines between those of pre-existing discourses, whose configuration has been solidified in the institutional framework of the CBD. Fourthly, DSI is an expert topic that involves a high degree of technical understanding. Well-resourced research institutions and companies that use DSI on a daily basis might formulate more quickly position statements and policy options than IPLCs and governments. Fifthly, Parties in the EU and JUSCANZ significantly aligned their position with their national research and industry sectors. By contrast, the submissions of developing countries, where most IPLCs live, focused on national interests and contained few examples of IPLCs and civil society, possibly due to a lack of consultation or outright marginalization.

The research also highlights how ABS discourses persist in the governance of an emerging technology. Although Scholz et al. (2021) have shown that most researchers from the OECD, G77 and BRICS countries use DSI that originates in their own region, some still uphold the 'myth' that the Global South supplies the North with DSI. Such systematic challenging of narratives, like Scholz et al. (2021) have achieved, however, involves a high degree of collaboration and use of scientific and financial resources. Actors lacking these would thus find it harder to challenge dominant storylines.

It is noteworthy that although ABS regulation for DSI will be further operationalized with each subsequent COP decision, the debate over the definition of DSI and its scope under the CBD is still unresolved. Because of new technologies are on the horizon with the potential to upheave ABS regulation, such as Google DeepMind's AlphaFold that uses artificial intelligence to predict protein structures, Parties might be hesitant to set this debate in stone, and instead maintain conceptual flexibility for DSI.

The findings finally invite further reflection on how discursive struggles in one domain of the CBD negotiations affect and are affected by struggles in other domains, and in other UN fora where DSI is discussed. Such investigation could therefore provide insights to the relationship between bargaining and discourse institutionalization.

6. Conclusions

In this article, we analysed the influence of discourses on the CBD negotiations on DSI. New storylines grounded in background discourses on ABS and biodiversity aided actors in understanding and framing the issue of DSI, and even in giving new meanings to ABS concepts. In the end, the pro-innovation and pro-regulation discourse coalitions maintained the dominance of the scientific and sustainable development discourses in ABS governance. Meanwhile, holistic and biopiracy discourses were marginalized in the policy process. The findings can help DSI negotiators, stakeholders and researchers to critically reflect upon worldviews, values and norms underlying ABS as instrument and their positions. This reflection would help to tackle biases and exclusion in DSI policy options. Further work is needed to investigate the influence of discourses on policy processes under the CBD in light of technological change, especially with regard to studying other discourses other than on biodiversity and ABS such as on open data.

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CRediT authorship contribution statement

B.E. (Bob) Kreiken: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **B.J.M. (Bas) Arts:** Conceptualization, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing.

Declaration of competing interest

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Data availability

The data that has been used is confidential.

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