Introduction

Until recently, the right to science has lingered at the periphery of international human rights discourse. Tellingly, some have labelled it the 'sleeping beauty'[1] of international human rights law. But this metaphor is far too gentle. The right to science is not simply asleep. It has been buried – under decades of doctrinal inattention, institutional inertia and a broader failure to imagine that science itself could, and should, be the object of rights discourse.

The right to science was enshrined as early as 1948 in the Universal Declaration of Human Rights (UDHR)[2] and later adopted in the legally binding International Covenant on Economic, Social and Cultural Rights (ICESCR)[3] in 1976 as well as in other international and regional treaties (see Section 3.1.2). Put simply, the umbrella term which has become known as the 'right to science' obliges states to:

- recognise the right of everyone to enjoy the benefits of scientific progress and its applications (Art. 15(1)(b) ICESCR);
- conserve, develop and diffuse science (Art. 15(2) ICESCR);

[1] Plozza, 'Awakening from "Sleeping Beauty's" Slumber: Curtain Up for the Human Right to Science', *Völkerrechtsblog* (2021); Porsdam Mann, Porsdam and Donders, '"Sleeping Beauty": The Right to Science as a Global Ethical Discourse', 42 *Human Rights Quarterly* (2020) 332; Riedel, 'Sleeping Beauty or Let Sleeping Dogs Lie? The Right of Everyone to Enjoy the Benefits of Scientific Progress and Its Applications (REBSPA)', in H. P. Hestermeyer et al. (eds.), *Coexistence, Cooperation and Solidarity: Liber Amicorum Rüdiger Wolfrum* (2011); Schabas, 'Looking Back: How the Founders Considered Science and Progress in Their Relation to Human Rights', 2015 *European Journal of Human Rights* (2015) 504.

[2] UN General Assembly, Universal Declaration of Human Rights (UDHR), Res 217 A(III), A/RES/3/217 A, 10 December 1948, Art. 27(1) UDHR: Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits.

[3] UN General Assembly, International Covenant on Economic, Social and Cultural Rights (ICESCR), Resolution 2200A (XXI), United Nations, Treaty Series, vol. 993, 3 January 1976.

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- respect the freedom indispensable for scientific research (Art. 15(3) ICESCR); and
- encourage and develop international contacts and co-operation in the scientific field (Art. 15(4) ICESCR).

Nevertheless, states, scholars and practitioners alike have either overlooked or misunderstood this potent provision, consigning it to a legal twilight zone. Despite publication of the UN Special Rapporteur's reports on the right to science in 2012[4] and the General Comment No. 25 on science and economic, social and cultural rights (Art. 15(1)(b), (2), (3) and (4) ICESCR) by the UN Committee on Economic, Social and Cultural Rights (CESCR) in 2020,[5] the right to science remained essentially dormant. A comprehensive analytical framework describing its potential normative content and what is required for its operationalisation is lacking. Therefore, it is time to blow the dust from a long-neglected yet fundamental human right. The question arises, however, regarding why the right to science has been lingering in a 'sleeping beauty' state until recently.

I.1 The Neglected Sleeping Beauty

The right to science continues to be an understudied and overlooked human right for reasons related to the ICESCR and its internal functioning in the human rights law framework: The false perception of a dichotomy of human rights has led to an insufficient understanding of the normative content of the right to science. Furthermore, its categorisation as a cultural right and its lack of emphasis and importance within the group of economic, social and cultural (ESC) rights have further contributed to this neglect. These reasons are now addressed in more detail.

For decades, a false dichotomy between the ICESCR and the ICCPR has distorted the trajectory of human rights law. While civil and political

[4] F. Shaheed, *Report of the Special Rapporteur in the Field of Cultural Rights: The Right to Enjoy the Benefits of Scientific Progress and Its Applications*, A/HRC/20/26 (2012); *Report of the Special Rapporteur in the Field of Cultural Rights: Copyright Policy and the Right to Science and Culture*, A/HRC/28/57 (2014); *Report of the Special Rapporteur in the Field of Cultural Rights*, A/70/279 (2015).

[5] UN Committee on Economic, Social and Cultural Rights (CESCR), *General Comment No. 25: Science and Economic, Social and Cultural Rights (Article 15 (1) (b), (2), (3) and (4) of the International Covenant on Economic, Social and Cultural Rights)*, E/C.12/GC/25 (2020).

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rights have been treated as immediate and justiciable, ESC rights – such as the right to science – have been patronisingly labelled as aspirational, non-enforceable and contingent on the benevolence of state discretion. This was accompanied by the wrongful assumption that the rights protected under the ICESCR were not real rights. Rather, they were believed to be aspirational goals that do not contain sufficiently concrete state obligations based on which a violation of a right could be invoked before a competent authority. As a consequence, ESC rights have not been perceived by some courts and governments as being justiciable.[6] In other words, they lack 'the quality of a legal rule to be invoked before judicial bodies and adjudicated upon'.[7] Hence, the right to science has rarely been invoked before even quasi-judicial authorities,[8] let alone formal courts,[9] particularly since few states have ratified the Optional Protocol on Economic, Social and Cultural Rights (OP-ICESCR).[10] Instead, protection concerning science and science-related issues is typically, if at all, sought via other more established human rights provisions such as the right to health, education or freedom of opinion and expression.

Moreover, until recently, little to no understanding of the normative content of the right to science existed, a situation that was both a result of and a reason for its neglect. Consequently, this right remained unknown, complex and under-used by academics and practitioners. One reason for this may be that the right to science is a right that was not already well known because it does not have constitutional origins, such as the right to freedom of opinion and expression, which has a long constitutional tradition. Concerning the other dimensions protected under Art. 15 ICESCR, the right to participate in cultural life (Art. 15(1)(a) ICESCR)

[6] Federal Supreme Court of Switzerland, *BGE 120 Ia 1*, 1994 para. 5d p. 12f. and confirmed in Federal Supreme Court of Switzerland, *BGE 126 I 240*, 2000.

[7] Bílková, 'Justiciability of Human Rights', in C. Binder et al. (eds.), *Elgar Encyclopedia of Human Rights* (2022) 370, at 370.

[8] The only case submitted to the Committee involving the right to science Committee on Economic, Social and Cultural Rights (CESCR), Committee on Economic, Social and Cultural Rights (CESCR), *Views Adopted by the Committee under the Optional Protocol to the International Covenant on Economic, Social and Cultural Rights, Concerning Communication No. 22/2017*, E/C.12/65/D/22/2017, 28 March 2019.

[9] An illustrative example of a case that has been brought at the national level: Tribunal Supremo, *López, Glenda, et al. v. Instituto Venezolano de Los Seguros Sociales (IVSS)*, Sentencia No. 487, 2001.

[10] UN General Assembly, Optional Protocol to the International Covenant on Economic, Social and Cultural Rights, A/RES/63/117, 2009.

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and author's rights (Art. 15(1)(c) ICESCR), a respective General Comment was adopted by the CESCR.[11] Therefore, rights holders could gain a clearer understanding of the normative content of their respective human rights. However, the General Comment No. 25 on science and ESC rights is relatively new and has existed only since 2020.[12]

The ambiguous scope of protection of the right to science – concerning questions such as what it entails, to whom it applies and what the respective state obligations are – has compounded difficulties in both monitoring and implementing the right. A lack of understanding regarding the scope of protection may have caused limited implementation at the national, regional, international and intergovernmental levels. This incomplete implementation has, in turn, inevitably led to non-compliance, restricting rights holders' full enjoyment of the right to science. The insufficient understanding of the implementation of the right has further resulted in two procedural consequences. Firstly, state parties rarely refer to the right to science in their reports because they may not find it as important as other human rights. Secondly, because rights holders often do not even know that the right to science exists, they rarely invoke it before judicial or quasi-judicial authorities.[13]

Furthermore, the procedure for bringing a violation of an ESC right forward under the OP-ICESCR has existed only since 2009[14] (see Section 2.4.1.1), whereas individual communications concerning civil and political rights have been eligible for submission to the Human Rights Committee (HRC) since the Optional Protocol to the ICCPR entered into force in 1976. Accordingly, the deficient knowledge about the normative content of the right to science alongside the relatively young complaint mechanism led to a general lack of (non-binding) 'Committee jurisprudence'. For this reason, it is unsurprising that the right to science remains neglected in the human rights monitoring and implementation landscape. However, the Committee broke this circle of

[11] UN Committee on Economic, Social and Cultural Rights (CESCR), *General Comment No. 17: The Right of Everyone to Benefit from the Protection of the Moral and Material Interests Resulting from Any Scientific, Literary or Artistic Production of Which He or She Is the Author (Article 15, Paragraph 1 (c), of the Covenant)*, E/C.12/GC/17 (2006); *General Comment No. 21: Right of Everyone to Take Part in Cultural Life (Art. 15, Para. 1(a), of the International Covenant on Economic, Social and Cultural Rights)*, E/C.12/GC/21 (2009).

[12] UN Committee on Economic, Social and Cultural Rights (CESCR), *supra* note 5.

[13] Riedel, *supra* note 1, at 507 f.

[14] UN General Assembly, *supra* note 10.

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non-implementation in 2020 by publishing General Comment No. 25 on science ESC rights.[15] Nevertheless, whether the publication of the General Comment will finally allow the right to science to gain more traction remains to be seen and will also depend on other factors (see Section 2.5).

Moreover, the right to science suffers from its uneasy classification as a 'cultural right' – a category long sidelined by human rights scholars wary of relativism and by policymakers reluctant to grapple with its normative indeterminacy.[16] Although the right to science is all too often referred to as a 'cultural right', a lack of clarity remains regarding which rights should qualify as 'cultural human rights' and whether categorising human rights in this manner is even helpful or sensible (see Section 4.2.1.4c).

Compounding this marginalisation is the right's bureaucratic misfortune: it appears dead last in the catalogue of substantive rights in the ICESCR. A technicality, perhaps – but one with consequences. The fact that it is the last human right addressed in the Covenant is a major disadvantage due to the CESCR's limited time for discussion. After a long day of dialogue, little time remains for the Committee to discuss the provisions of the right to science.[17] Schabas states this more precisely: '[I]f economic, social and cultural rights lie at the vanishing point of international human rights law, then the question of the right to enjoy the benefits of scientific and technological progress and its applications lies at the vanishing point of economic, social and cultural rights.'[18] Consequently, a reversal of the order of the topics discussed by the Committee has been suggested.[19]

I.2 Why Does the Right to Science Matter?

If ever there were a time to rescue the right to science from the margins, that time is now. In the twenty-first century, science no longer occupies

[15] UN Committee on Economic, Social and Cultural Rights (CESCR), *supra* note 5.
[16] On the developments of cultural rights, see Donders, 'Cultural Rights in International Human Rights Law: From Controversy to Celebration', in *Japanese Yearbook of International Law*, vol. 62 (2019) 61.
[17] Riedel, *supra* note 1, at 505 f.
[18] Schabas, 'Study of the Right to Enjoy the Benefits of Scientific and Technological Progress and Its Applications', in Y. Donders and V. Volodin (eds.), *Human Rights in Education, Science and Culture: Legal Developments and Challenges* (2007), at 274.
[19] Riedel, *supra* note 1, at 505 f.

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the periphery of our lives – it saturates every domain, from health care and education to national security and the economy. Scientific advancement is no longer optional. It is existential. And yet, the right to science remains largely invisible in public discourse, legal scholarship and state practice – a sleeping right in a world increasingly governed by data, algorithms and innovation.

Humanity today faces a cascade of global crises that are inescapably scientific in nature: climate collapse, pandemics, artificial intelligence and ecological degradation. These are not problems that can be solved by courts or constitutions alone. They require scientific knowledge, technological innovation and – crucially – equitable access to both. In this context, the right to science emerges not merely as a cultural ornament but as a normative keystone. It is the right that enables all others. It guarantees that knowledge is not the preserve of elites, that innovation serves the public good and that progress does not trample the vulnerable in its path.

Science and technology are key elements in managing and combatting present and future risks, disasters and global challenges such as climate change, pandemics and artificial intelligence. Public access to, availability of and participation in science is essential to address, for example, threats to democracy in times of 'infodemics', such as misinformation, disinformation and post-truth politics. The right to science, therefore, offers the possibility to frame the discourse of the greatest potential: the increasing dominance of science and technology in our lives, our dependence on them and the growing ability of the wealthy and influential to manipulate public opinion for their own benefit all underscore the importance and potential benefits of a tool such as the human right to science. The right to science, thus, is critical: it is the backbone of democracy and the appropriate normative tool to address the present and future challenges just mentioned.

But the importance of the right to science is not only political – it is deeply jurisprudential. It fills a conspicuous gap in international human rights law by providing a 'normative home' for concepts long left drifting. Academic freedom, open access, public-interest technology – these have often been treated as peripheral concerns or subsumed under broader rights such as freedom of expression or education. The right to science does not merely echo these rights; it anchors them. This establishment of a 'normative home' not only elevates the status of these concepts and interests but also integrates them more cohesively into the broader fabric of human rights law, ensuring that they receive the attention and protection they warrant.

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In addition, the right to science provides a necessary counterbalance to legal regimes that prioritise commercial or proprietary interests over public access. Over the past several decades, intellectual property and trade frameworks – particularly the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) – have increasingly shaped the global governance of science and innovation. As one might expect, the interests under IP and trade law are better implemented since more time and focus from states and practitioners (including private economic actors) have been invested in the institutionalisation of these legal regimes, whereas the right to science remains neglected, underdeveloped and, consequently, under-used. These regimes, although legitimate in their aims, tend to emphasise exclusivity and market control. By contrast, the human rights framework – and the right to science in particular – emphasises universality, inclusion and public interest. As such, the right to science is well positioned to recalibrate legal and policy frameworks to better reflect equity and social justice concerns.

Finally, and most importantly, the right to science matters because of whom it serves. As a human right, it must be understood not from the vantage point of the privileged, but through the eyes of the marginalised. Science, when left unchecked, too often reinforces inequality – through differential access to health technologies, algorithmic discrimination or the exclusion of Global South voices from scientific agendas. The human rights perspective mandates an explicit focus on those who are structurally disadvantaged – whether due to poverty, geographic isolation, disability, or discrimination. As stated during the meeting for the adoption of the two Covenants, 'We, the unarmed, the economically underdeveloped, the technologically underprivileged, have no strength except the strength of law ... [and so] we are pleased to vote for the draft Covenants on Human Rights.'[20] That statement reflects a deeper truth about the function of human rights: they exist not only to limit the excesses of power but also to empower those who would otherwise be left without recourse. In this respect, the right to science reinforces the broader architecture of human rights law and aligns with its foundational objectives.

In sum, the right to science matters not only because it reflects the realities of an increasingly science-dependent world, but also because it

[20] Mr Ornes-Coiscou (Dominican Republic), speaking at the General Assembly Plenary Meeting, 21 General Assembly Official Records (GAOR), 1495th Meeting (16 December 1966) paras 137–8.

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fills normative and institutional gaps within the current legal landscape. It connects issues of knowledge production, access and justice. As both a legal right and a policy tool, it has the potential to guide science towards the public good – ensuring that its benefits are shared, its harms mitigated and its power responsibly governed.

I.3 Research Question and Aim

The overlooked status of the right to science, coupled with its significant societal and jurisprudential implications, underscores the need for a detailed conceptual and legal analysis of its normative content to allow rights holders to effectively invoke the right to science at the national and international levels.

This inquiry leads to the central research question that animates this book: what constitutes the justiciable normative content of the right to science – in particular, its core content – for the subjects and addressees according to international human rights law?

Answering this question is urgent for two reasons. On the one hand, this will finally empower rights holders to invoke the right to science before competent (quasi-)judicial authorities. On the other hand, it will provide states, international organisations and other stakeholders sufficient guidance to implement, monitor or enforce the right to science in legislation, jurisprudence and policy.

To that end, this book pursues two interrelated goals. First, it seeks to bridge a significant gap in current scholarship and practice by conceptualising the right to science and establishing its normative content, particularly its core content, in the service of rendering it justiciable, which will facilitate its further operationalisation in judicial and quasi-judicial settings.

Second, this research aims to contribute to the broader discourse within international human rights law regarding the dichotomy and categorisation of human rights.[21] This discourse has frequently resulted

[21] Bílková, *supra* note 7; Boyle, *Economic and Social Rights Law: Incorporation, Justiciability and Principles of Adjudication* (2020); Koch, 'Dichotomies, Trichotomies or Waves of Duties?', 5 *Human Rights Law Review* (2005) 81; Scott, 'Interdependence and Permeability of Human Rights Norms: Towards a Partial Fusion of the International Covenants on Human Rights', 27 *Osgoode Hall Law Journal* (1989) 769; Sepúlveda Carmona, *The Nature of the Obligations under the International Covenant on Economic, Social, and Cultural Rights* (2003); T. Wirthle, *Immediate and Progressive Realisation in International Human Rights Law* (2025).

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in overly simplified assertions about the non-justiciability of ESC rights and, thus, reductive claims that they are not suitable for judicial review. By using the right to science as an example, this book challenges these inherited distinctions and exposes the legal fiction underlying the presumed non-justiciability of ESC rights. The objective is to demonstrate, in line with the principle of indivisibility, interdependence and interrelatedness,[22] that the existing gap in what is referred to as material justiciability can be closed effectively. It advances the claim that the right to science – like other ESC rights – is amenable to judicial scrutiny.

In doing so, it reasserts the legal force of ESC rights and invites a broader reconsideration of the way human rights are implemented. The right to science, long relegated to the periphery, is thus brought to the centre – not only as a matter of topical urgency, but as a catalyst for rethinking how human rights law understands itself.

I.4 Book Outline

This book unfolds in three parts, each building upon the last to offer a comprehensive, legally grounded and conceptually nuanced account of the right to science.

The first part lays the groundwork by establishing the legal terrain upon which the argument rests. Chapter 1 introduces the methodologies and sources employed, providing the conceptual scaffolding and doctrinal tools necessary for the chapters that follow. Chapter 2 turns a critical eye to the notion of justiciability. It dismantles received wisdom, establishes an understanding between formal and material justiciability and identifies the latter's shortcomings as the conceptual entry point for this study. These deficiencies frame the central research question and underscore the urgent need to reconceptualise how ESC rights, particularly the right to science, are understood within legal doctrine.

The second and third parts discuss the normative content of the right to science. The normative content is understood as two parts of the same coin: the subjects of rights (rights holders) and their corresponding duty bearers (addressees). For the subjects of human rights, normative content outlines the scope of protection provided by a human right. In the context of the right to science, for instance, two questions arise: (1) Who is entitled to this right? (2) To what extent does this entitlement

[22] UN General Assembly, Vienna Declaration and Programme of Action, A/CONF.157/23, 25 June 1993, para. 5.

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reach?[23] From the perspective of the addressees of human rights, its normative content also raises questions about the obligations linked to the right: Who is responsible for ensuring that the right to science is upheld? What specific duties do these responsible entities have? As such, normative content entails two sides of the same coin: on the one side, elements pertaining to the rights, meaning the scope of protection for subjects of human rights and, on the other, elements pertaining to the obligations for addressees of human rights.

The second part begins with the first side of the coin of human rights: the right to science from the perspective of rights holders, meaning the scope of protection of the right to science. The scope of protection is composed of the substantive scope (i.e., what the right entails) and the personal scope (i.e., who the rights holders are). To establish the substantive scope, Chapter 3 explores the historical development of the right to science and examines the essential terminology underlying it by providing a human rights understanding of science. Chapter 4 then maps the right to science's interconnectedness with other human rights – such as education, health and freedom of expression – highlighting the synergies and normative cross-pollination that enrich its scope.

Chapter 5 further establishes the substantive scope of the right to science by drawing upon insights from the two preceding chapters concerning terminology and the interconnectedness with other human rights. Within this context, attention is directed towards the core content of the right to science, a concept that, despite its significance, remains largely unexplored in international human rights scholarship and practice. This exploration is pivotal; it highlights justiciable aspects of the right to science and is thereby helpful in bridging the identified gaps in material justiciability. Chapter 6 completes this part by shifting the focus to the personal scope of the right. It examines who qualifies as a rights holder under of the right to science under international law – individuals, legal persons and future generations – exploring both settled jurisprudence and emerging trends.

Transitioning to the other side of the coin, the third part shifts the focus to the duty bearers of the right to science. Chapter 7 identifies the relevant duty bearers of the right to science – those responsible for realising its various core obligations. These include not only states, but

[23] The scope of protection encompasses not only the substantive and personal, but also the territorial and temporal dimensions of human rights. This book will only focus on the substantive and personal scope.

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also international organisations and private actors, thereby acknowledging the pluralistic nature of the scientific ecosystem. Chapter 8 addresses a more delicate issue: the limitations that may lawfully be placed upon the exercise of the right to science. Drawing primarily on Art. 4 ICESCR, the chapter delineates the conditions under which limitations are permissible and contrasts these with the broader framework under the ICCPR. It then extends beyond positive law to explore the normative role of scientific self-regulation. Ethical standards and informal norms are re-examined through a legal lens, highlighting how human rights law can inform, support and in some cases demand, scientific restraint and responsibility.

Finally, Chapter 9 draws the threads together. It summarises the book's key findings and outlines their implications for the implementation, adjudication and future development of the right to science. It concludes by offering a roadmap for embedding the right to science more firmly within the global human rights agenda – both as a legal norm and as a critical instrument for navigating the profound scientific, ethical and political challenges of the twenty-first century.

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