8

Limitations on the Right to Science

Limitations are a double-edged tool in the framework of international human rights law: they operate both as a sword and a shield.[1] On the one hand, they empower States to impose certain constraints on human rights. On the other, they serve a protective function, ensuring that any such constraints are legally justified, narrowly defined and carefully implemented. This dual character underscores the inherently delicate balancing act at the heart of the limitations regime.

The right to science is no exception. It is not absolute and, as recognised by the CESCR, it may be subject to limitations. In its General Comment No. 25, the Committee acknowledged that 'some limitations on the right to participate in and to enjoy the benefits of scientific progress and its applications might be necessary, as science and its applications can, in certain contexts, affect economic, social and cultural rights'.[2]

This chapter undertakes that task. It begins by outlining the general framework of limitations in international human rights law, with a particular focus on the ICESCR. The discussion then explores the specific requirements for limitations under Art. 4 ICESCR, followed by three essential distinctions related to limitations. First, the chapter clarifies the distinction between limitations and progressive realisation or, more specifically, retrogressive measures, which may assume the characteristics of limitations. Second, it compares the ICESCR's framework for limitations to that ICCPR. Third, the chapter shifts from a purely legal framework to consider the informal, yet influential, realm of scientific

[1] Alston and Quinn, 'The Nature and Scope of States Parties' Obligations under the International Covenant on Economic, Social and Cultural Rights', 9 *Human Rights Quarterly* (1987) 156, at 193.

[2] 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), at 21.

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self-regulation. Here, it explores how ethical boundaries – often developed within scientific disciplines – intersect with, and might be informed by, human rights norms.

These reflections raise a broader question: do human rights norms simply repackage existing ethical debates under a legal veneer or do they offer something more – something normatively distinct and institutionally robust? In engaging this question, the chapter sets the stage for a deeper inquiry into the capacity of human rights to serve not only as legal constraints but also as guiding principles for responsible science.

8.1 Limitations under the ICESCR

Unlike the ICCPR, which sets out a rights-specific approach to limitations and permits derogations in times of emergency (Art. 4 ICCPR), the ICESCR adopts a markedly different stance. It contains a single, general limitations clause in Article 4, which applies to all rights recognised in the Covenant. This framework is both broader and more flexible in scope. However, it is also more restrained in one crucial respect: the ICESCR does not allow for derogations under any circumstances – not even during public emergencies. In this way, the Covenant establishes a comprehensive but non-derogable structure for limiting ESC rights.[3]

Although the ICESCR adopts a general approach to limitations through Art. 4 ICESCR, it also contains several right-specific limitation clauses. These function as *lex specialis* and therefore take precedence over the general limitations provision where applicable. For example, it addresses restrictions on the rights of non-nationals in developing countries under Art. 2(3) ICESCR and restrictions on trade union rights under Art. 8 ICESCR. Furthermore, Art. 13(3) and (4) ICESCR permit states to establish minimum educational standards, which potentially impact the educational freedom of parents, guardians and educational institutions with regard to educational choices (see Section 4.2.4). Additionally, in the context of the right to health, Art. 12(2) ICESCR allows states to undertake necessary steps for the full realisation of the right to health, which encompass measures for the prevention, treatment and control of epidemic, endemic, occupational and

[3] For more in-depth insights into the drafting history and the divergent approaches to limitations in both the ICESCR and ICCPR, please refer to Alston and Quinn, *supra* note 1, at 194 ff; Saul, Kinley and Mowbray, *The International Covenant on Economic, Social and Cultural Rights: Commentary, Cases, and Materials* (2014), at 241 ff.

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other diseases. These specific clauses should be understood as self-contained and narrowly applicable to the rights they govern. Interpreting them as merely subsets of Art. 4 ICESCR would not only dilute their distinct legal functions but also risk rendering them redundant. Therefore, these clauses should be viewed as distinct and central in their own right and each addresses the nuances and requirements of the particular rights that they govern.[4]

Finally, several economic, social and cultural rights allow for the reconciliation of competing public interests without the need to invoke the express limitation clause in Art. 4 ICESCR. In such cases, limitations are embedded within the primary rule itself – either through its definition or authoritative interpretation – thereby setting the parameters of permissible restrictions. This approach permits a more context-sensitive balancing of individual rights and broader societal interests without defaulting to the general limitations framework.[5]

In the specific context of the right to enjoy the benefits of scientific progress and its applications, as enshrined in Art. 15(1)(b) ICESCR, this internal balancing becomes evident. Here, the evaluation of whether science serves the public good is not determined by reference to what is 'necessary for the general welfare' under Art. 4 ICESCR. Rather, the beneficial nature of science is presumed and embedded directly in the normative content of Art. 15(1)(b) itself. As such, the legitimacy of scientific progress is not subject to an external test of utility but flows inherently from the article's formulation.

8.2 Requirements for Limitations under Art. 4 ICESCR

Concerning limitations on the right to science, the Committee outlined that:

> Limitations on the applications of science and technology can be used to guarantee the safety and quality of products used by persons. Human rights impact assessments might be necessary to protect persons against risky applications. Limitations on the research process can also be necessary, particularly when the research affects human beings in order to protect their dignity, their integrity and their consent when involved in the research. When the research is done in countries or among populations different to those of the researchers, the State of origin must

[4] Saul, Kinley and Mowbray, *supra* note 3, at 244.
[5] Ibid., at 245 f.

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> guarantee the rights and obligations of all parties involved. Nevertheless, any limitation on the content of scientific research implies a strict burden of justification by States, in order to avoid infringing freedom of research.[6]

Since the right to science does not contain a specific limitations clause, any constraint imposed on its exercise must be assessed under the general limitations framework provided in Art. 4 ICESCR. According to this provision, state parties may impose limitations only if they are 'determined by law only in so far as this may be compatible with the nature of these rights and solely for the purpose of promoting the general welfare in a democratic society'. This tripartite requirement reflects a high threshold for justifying limitations and aims to prevent arbitrary or excessive interference. Donders has offered an in-depth analysis of how these criteria apply specifically to the right to science.[7] Building on that foundation, the following discussion provides a concise overview of the key requirements derived from Art. 4 ICESCR.

8.2.1 Determined by Law

Limitations on rights must first be determined by law.[8] The Limburg Principles clarify that: 'No limitation on the exercise of economic, social and cultural rights shall be made unless provided for by national law of general application which is consistent with the Covenant and is in force at the time the limitation is applied'.[9] The term 'law' is broadly interpretated by international supervisory bodies; it encompasses not only

[6] UN Committee on Economic, Social and Cultural Rights (CESCR), *supra* note 2, at 22.

[7] Donders, 'Balancing Interests: Limitations to the Right to Enjoy the Benefits of Scientific Progress and Its Applications / Une Balance Des Intérêts – Les Restrictions Au Droit de Bénéficier Du Progrès Scientifique et de Ses Applications', 2015 *European Journal of Human Rights* (2015) 486; Donders and Plozza, 'Look before You Leap: States' Prevention and Anticipation Duties under the Right to Science', 28 *The International Journal of Human Rights* (2024) 354.

[8] For an overview see Saul, Kinley and Mowbray, *supra* note 3, at 248 ff; see also Donders, *supra* note 7, at 497; Müller, 'Limitations to and Derogations from Economic, Social and Cultural Rights', 9 *Human Rights Law Review* (2009) 557, at 578 ff; Donders and Plozza, *supra* note 7, at 361.

[9] UN Commission on Human Rights, *Limburg Principles on the Implementation of the International Covenant on Economic, Social and Cultural Rights*, Items 8 and 14 of the provisional agenda, E/CN.4/1987/17 (1987), at 48; the Limburg Principles are derived from the Siracusa Principles, see 'The Siracusa Principles on the Limitation and Derogation Provisions in the International Covenant on Civil and Political Rights', 7 *Human Rights Quarterly* (1985) 3.

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written statutes but also unwritten law.[10] However, the HRC noted that a limitation cannot be 'enshrined in traditional, religious or other such customary law'.[11] The CESCR affirmed this expansive understanding in several of its general comments.[12] Moreover, these laws must be non-arbitrary, reasonable and non-discriminatory, as well as accessible and foreseeable to those whom they affect.[13]

8.2.2 *Compatible with the Nature of These Rights*

Art. 4 ICESCR requires that any limitation must be compatible with the nature of the rights concerned. This means that a limitation must not undermine the core content of the right.[14]

This requirement operates on three levels. First, it protects rights that, by their very nature, are not open to limitation.[15] This instils a non-derogable quality within the Covenant's rights and precludes particularly severe forms of restrictions. Nevertheless, a correct implementation of the principle of proportionality would inherently protect these rights from excessive limitations.[16] Consequently, core rights and obligations under the framework of ESC rights are clearly excluded from limitations.[17] Second, blanket limitations on all ESC rights are unequivocally

[10] UN Human Rights Committee (HRC), *General Comment No. 16: Article 17 (Right to Privacy), The Right to Respect of Privacy, Family, Home and Correspondence, and Protection of Honour and Reputation*, A/43/40 (1988), at 3, 4 and 8; European Court of Human Rights (ECtHR), *Sunday Times v. The United Kingdom*, 6538/74, 26 April 1979, at 47–49.

[11] UN Human Rights Committee (HRC), *General Comment No. 32: Article 14: Right to Equality before Courts and Tribunals and to Fair Trial*, CCPR/C/GC/32 (2007); *General Comment No. 34 – Article 19: Freedoms of Opinion and Expression*, CCPR/C/GC/34 (2011) 870.

[12] UN Committee on Economic, Social and Cultural Rights (CESCR), *General Comment No. 7: The Right to Adequate Housing (Art.11.1): Forced Evictions*, E/C.12/1997/4 (1997); *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); *General Comment No. 26: Land and Economic, Social and Cultural Rights*, E/C.12/GC/26 (2023).

[13] These were derived from the UN Commission on Human Rights, *Syracuse Principles on the Limitation and Derogation of Provisions in the ICCPR*, E/CN.4/1985/4 (1984), at 15–18; *supra* note 9, at principles No. 48–50.

[14] Donders, *supra* note 7, at 502; Alston and Quinn, *supra* note 1, at 201; Saul, Kinley and Mowbray, *supra* note 3, at 258.

[15] Alston and Quinn, *supra* note 1, at 201.

[16] Donders, *supra* note 7, at 502; Saul, Kinley and Mowbray, *supra* note 3, at 258.

[17] UN Commission on Human Rights, *supra* note 9, at 56.

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prohibited, except in the rare circumstance in which a limitation is demonstrated as compatible with the essence of each right. Third, the burden lies with the state to demonstrate that any limitation meets this threshold. It must offer specific justification, not general assertions, to show that the limitation respects the right's inherent nature.[18]

8.2.3 Promoting General Welfare

The phrase 'general welfare in a democratic society' – or, as expressed in the Limburg Principles, 'furthering the well-being of the people as a whole'[19] – is notably broad and somewhat ambiguous. The *travaux préparatoires* confirm that limiting legitimate aims to 'general welfare' was a deliberate choice. This departs from the ICCPR, which permits broader grounds for limitation, including national security, public order and morals. These were expressly excluded from Art. 4 ICESCR, as they were not considered appropriate bases for restricting ESC rights. For instance, appeals to public morals or order were not regarded as valid grounds for limiting essential rights such as food or health.[20]

Nevertheless, states frequently invoke national security or economic development to justify non-compliance with ESC rights. Art. 4 ICESCR clearly limits such justifications to those that are compatible with the notion of 'general welfare'. This necessitates an objective, not subjective, test for evaluating the legitimacy of a government's interpretation. Accordingly, determinations of 'general welfare' should remain open to scrutiny by the international supervisory body tasked with overseeing implementation of the Covenant.[21]

8.2.4 In a Democratic Society

Another element for limitations under Art. 4 ICESCR is that measures taken must be for the purposes of general welfare 'in a democratic society'. According to the *travaux préparatoires*, the concept of democracy may have diverse interpretations in various nations.[22] This is

[18] Alston and Quinn, *supra* note 1, at 201.
[19] UN Commission on Human Rights, *supra* note 9, at 52.
[20] Alston and Quinn, *supra* note 1, at 201 f.; Donders, *supra* note 7, at 497 ff; Donders and Plozza, *supra* note 7, at 361; Müller, *supra* note 8, at 570 ff; Saul, Kinley and Mowbray, *supra* note 3, at 250 ff.
[21] Alston and Quinn, *supra* note 1, at 202.
[22] Ibid., at 203.

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reflected in the Limburg Principles: 'While there is no single model of a democratic society, a society which recognises and respects the human rights established in the United Nations Charter and the Universal Declaration of Human Rights may be viewed as meeting this definition'.[23]

Historically, debate has centred on whether the term 'democratic society' should be viewed 'as a substantive autonomous requirement of Article 4, or just as rhetorical gloss'.[24] According to the Limburg Principles, '[t]he expression "in a democratic society" shall be interpreted as imposing a further restriction on the application of limitations'.[25]

In their general comments, concluding observations and other documents, both the HRC and the CESCR seldom elaborate on the phrase 'in a democratic society'. Yet, when addressing the phrase 'necessary in a democratic society', the HRC typically focuses on the principle of proportionality inherent to the term 'necessary', without extensively commenting on the characteristics or requirements of a 'democratic society'.[26] Consequently, the HRC often implicitly incorporates two pivotal criteria under its interpretation of a 'democratic society': necessity and proportionality. These have continuously emerged as independent general principles when assessing the lawfulness of any imposed limitations.[27] The CESCR has also embraced these criteria in its interpretations; thus, they warrant a closer examination.[28]

8.2.4.1 Necessity

The term 'necessary' suggests that limitation measures should address a pressing social need. This interpretation can also give rise to positive obligations, such as providing special protection to vulnerable groups such as children, the elderly, minorities, or persons with disabilities.[29] The Committee considers that limitations to the right to science may be necessary in cases in which scientific activities may have an impact on

[23] UN Commission on Human Rights, *supra* note 9, at 55.
[24] Saul, Kinley and Mowbray, *supra* note 3, at 254.
[25] UN Commission on Human Rights, *supra* note 9, at 53.
[26] See analysis by Müller, *supra* note 8, at 576 with references therein.
[27] For more information, including on the development of the concept of 'in a democratic society' by the European Court of Human Rights, see Saul, Kinley and Mowbray, *supra* note 3, at 254 ff; Müller, *supra* note 8, at 575 ff; Donders, *supra* note 7, at 498.
[28] UN Committee on Economic, Social and Cultural Rights (CESCR), *supra* note 12, at 19; *supra* note 2, at 21.
[29] Donders, *supra* note 7, at 499; Donders and Plozza, *supra* note 7, at 362 f.

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other human rights or to ensure the safety and quality of products used by individuals. In addition, the Committee has emphasised that limitations on the research process may also be necessary, particularly in research involving human participants. Such limitations are necessary to protect human dignity and integrity and to ensure informed consent.[30]

8.2.4.2 Proportionality

Beyond the requirement of necessity, limitations must also be proportionate to the legitimate aim pursued and represent the least restrictive means necessary to achieve this aim.[31] The principle of proportionality dictates that the essential core of the right should not be compromised. This is particularly crucial when balancing the various interests protected under the right to science.[32] In light of these principles, the Committee referenced General Comment No. 19 on the right to participate in cultural life in its General Comment No. 25 on science and ESC rights, stating that limitations

> must respect the minimum core obligations of the right, and must be proportionate to the aim pursued. This means that where there are several means reasonably capable of achieving the legitimate aim of the limitation, the one that is least restrictive to economic, social and cultural rights must be selected, and the burdens imposed on the enjoyment of the right should not outweigh the benefits of the limitation.[33]

While the Committee only mentioned core obligations, core rights must also inevitably be accounted for in this assessment.

In the context of the right to science, a crucial question is how to achieve a proportionate balance, especially when one aspect of this right must be limited to protect another. For instance, limiting scientific

[30] UN Committee on Economic, Social and Cultural Rights (CESCR), *supra* note 2, at 21.

[31] UN Commission on Human Rights, 'Syracuse Principles on the Limitation and Derogation of Provisions in the ICCPR', para. 10 f.; UN Human Rights Committee (HRC), 'CCPR General Comment No. 22: Article 18 (Freedom of Thought, Conscience or Religion)', 30 July 1993, para. 8, https://digitallibrary.un.org/record/182777?ln=en (accessed 3 January 2023); UN Human Rights Committee (HRC), 'CCPR General Comment No. 27: Article 12 (Freedom of Movement)', 2 November 1999, para. 14, https://digitallibrary.un.org/record/366604?ln=en (accessed 3 January 2023); UN Human Rights Committee (HRC), 'General Comment No. 31: The Nature of the General Legal Obligation Imposed on States Parties to the Covenant', 26 May 2004, para. 6, https://digitallibrary.un.org/record/533996?ln=en (accessed 3 January 2023).

[32] Müller, *supra* note 8, at 784; UN Committee on Economic, Social and Cultural Rights (CESCR), *supra* note 2, at 21.

[33] UN Committee on Economic, Social and Cultural Rights (CESCR), *supra* note 2, at 21.

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freedom may be necessary to safeguard individuals from the harmful effects of scientific advancement. To address such dilemmas, Beiter proposed 'adequacy for science' as a balancing criterion; it suggests that decisions and structures within the realm of science should primarily serve the best interests of science and scholarship. This approach prioritises the intrinsic value and requirements of science over political, economic, or social expedience. It also implies that, due to their expertise and experience, researchers should play a central role in determining the needs and direction of scientific endeavours.[34]

However, Beiter's proposed criterion of 'adequacy of science' to achieve a proportionate balance may not be necessary, as this approach is explicitly encompassed by the existing framework of general limitations under Art. 4 ICESCR. Specifically, the criterion of inherent compatibility 'with the nature of these rights' serves the same purpose. This clause requires that any imposed limitations must align with the fundamental character and aim of the rights outlined in the Covenant. Therefore, the need for a separate criterion of 'adequacy of science' is arguably redundant, given that the requisite balance and compatibility are already integral considerations under the existing limitations criterion. However, this requires a clear understanding of the nature and purpose – essentially, the scope of protection – of the right in question. This understanding is important because it provides the basis for determining the nature and extent of permissible limitations.

8.3 Distinctions from Limitations in the ICESCR

It is essential to distinguish limitations under the ICESCR from related yet distinct concepts. This section outlines four key distinctions. First, limitations must be clearly separated from the Covenant's obligation of progressive realisation and, more specifically, the prohibition of retrogressive measures. Second, the limitations framework in the ICESCR must be distinguished from that of the ICCPR. While both concern human rights, their approaches differ. Lastly, legal limitations under the ICESCR must be set apart from self-imposed restrictions. This final distinction is significant, as self-regulation – typically undertaken by

[34] Beiter, 'Where Have All the Scientific and Academic Freedoms Gone? And What Is 'Adequate for Science'? The Right to Enjoy the Benefits of Scientific Progress and Its Applications', 52 *Israel Law Review* (2019) 233, at 238.

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scientists based on ethical guidelines or moral norms – is often mistakenly conflated with legal limitations governed by human rights law.

8.3.1 *Clarifying the Concepts of Limitations and Progressive Realisation*

Distinguishing between limitations and progressive realisation is critical for understanding their interplay within the framework of ESC rights. Art. 4 ICESCR permits certain limitations on these rights (see Section 8.2). By contrast, the principle of progressive realisation, as outlined in Art. 2(1) ICESCR, relates to a state's obligation to fulfil these rights in accordance with its maximum available resources. Failure to allocate sufficient resources to ESC rights could be interpreted as an unlawful restriction. However, it is now acknowledged that progressive realisation functions as a principle that is autonomous from the general framework of limitations. By contrast, limitations typically involve a state's authority to limit a particular right or protection in favour of another right or a more significant public interest. Therefore, these principles operate on separate conceptual levels, albeit concurrently. The Committee has infrequently addressed the issue of progressive realisation versus limitations, likely because resource constraints are the predominant reason for the non-fulfilment of ESC rights.[35] The Committee typically views instances in which progressive realisation is unmet due to such constraints as separate from deliberate limitations on these rights. Consequently, to address situations in which there is a regression rather than progression in the realisation of these rights, the Committee established criteria for assessing what it terms 'retrogressive measures'.[36]

Practically differentiating between retrogressive measures and limitations often proves challenging, as the distinctions between them are minimal. Consequently, Müller advocated for a unified standard that merges these concepts to assess all forms of limitations, including retrogressive measures.[37] Without such a unified approach, it would be relatively easy for states to sidestep the obligations outlined in Art. 4 ICESCR, as Art. 2(1) ICESCR does not indicate when a restriction is legitimate. Thus, restrictions can frequently be linked to resource scarcity

[35] Saul, Kinley and Mowbray, *supra* note 3, at 246 f.
[36] On retrogressive measures on the right to science, see UN Committee on Economic, Social and Cultural Rights (CESCR), *supra* note 2, at 24.
[37] For a more detailed analysis of this issue, please see Müller, *supra* note 8.

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under the principle of progressive realisation encapsulated in Art. 2(1) ICESCR.[38] Alston and Quinn highlighted this issue and noted that it allows states to rationalise limitations on a de facto basis under Art. 2(1) ICESCR rather than on a de jure basis, as mandated by Art. 4 ICESCR.[39]

8.3.2 *Limitations under the ICCPR*

In contrast to the general limitations clause in Art. 4 ICESCR, the ICCPR sets out right-specific limitation clauses and recognises a wider range of legitimate aims. An example is the right to freedom of expression, which closely relates to the right to science and scientific freedom (see Section 5.4.3). Art. 19(3) ICCPR stipulates that rights carry 'special duties and responsibilities' and may be subject to certain restrictions, but only those that are provided by law and are necessary for (a) respecting the rights or reputations of others and (b) protecting national security, public order (*ordre public*), public health or morals. The clause concerning the rights of others highlights the delicate balance between competing rights, even where such rights may not be enshrined in the same instrument.

It is important to recognise that the rights and freedoms of others may not necessarily be acknowledged within the same legal instrument. Moreover, legitimate aims such as protecting national security, public order and health highlight the essential equilibrium that must be maintained between the interests and rights of individuals and groups and those of the broader public.[40]

The inclusion of national security, public order and public health as legitimate aims underscores the importance of balancing individual and collective interests. These aims may justify limitations on the right to science, particularly where scientific freedom or technologies pose risks. Ethical concerns in genetic research and threats linked to biological or nuclear weapons exemplify such cases. Likewise, data protection and privacy in scientific research may necessitate limitations to safeguard the rights of others.[41]

[38] Ibid., at 590.
[39] Alston and Quinn, *supra* note 1, at 205.
[40] Donders and Plozza, *supra* note 7, at 362; See also 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), at 13 f.; UN Commission on Human Rights, *supra* note 13, at 35. The Syracuse Principles were adopted by a group of international law experts and meant to elaborate and come to uniformity in the interpretation of the conditions and grounds for permissible limitations and derogations.
[41] Donders, *supra* note 7, at 498; Donders and Plozza, *supra* note 7, at 362.

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Donders contended that, although these limitations diverge from the initial conception of ICESCR's creators – as they are present in the ICCPR but absent in the ICESCR – they align with the dynamic character of international human rights law. This body of law increasingly considers contemporary contexts and treaty objectives rather than relying solely on historical interpretation (see Sections 1.1.2.4 and 3.1.2).[42]

This debate was also prominent during the drafting of Art. 15(3) ICESCR, which stresses the need for states to respect the 'freedom indispensable for scientific research'. Some states have expressed reservations about the term 'indispensable', fearing that it might suggest protection only for freedoms that are absolutely necessary for research. On the other hand, other states have advocated for the inclusion of this term to allow for necessary limitations for reasons such as national security, public order and morality (see Sections 3.1.1 and 5.4.3).[43]

8.3.3 *Old Wine in New Bottles? Scientific Self-Regulation as a Matter of Human Rights Limitations*

Limitations on human rights, including the right to science, are legal restrictions imposed by states. They must satisfy rigorous criteria to be valid. In the context of scientific research, however, ethical boundary-setting and self-regulation by researchers, scientists and academics play a central role. These professionals bear the expectation of upholding ethical and responsible standards throughout all phases of their work – from research design to dissemination.[44] This expectation becomes especially critical in today's scientific landscape, where groundbreaking advancements in fields like genetic engineering and the development of brain organoids raise profound ethical and safety concerns.

Scientific progress frequently moves faster than its ethical and social implications can be fully understood. At the outset of a project, researchers may not foresee its full impact. Work driven by benevolent motives

[42] Donders, *supra* note 7, at 498 f.

[43] Smith, 'Understanding the Nature and Scope of the Right to Science through the Travaux Préparatoires of the Universal Declaration of Human Rights and the International Covenant on Economic, Social and Cultural Rights', 24 *The International Journal of Human Rights* (2020) 1156, at 1167; see also Donders and Plozza, *supra* note 7, at 362.

[44] Godecharle et al., 'Scientists Still Behaving Badly? A Survey within Industry and Universities', 24v *Science and Engineering Ethics* (2018), 1697, https://doi.org/10.1007/s11948-017-9957-4; Martinson, Anderson and de Vries, 'Scientists Behaving Badly', 435 *Nature* (2005): 737, https://doi.org/10.1038/435737a.

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can nonetheless lead to harm, as seen in the transformation of nuclear energy research into the development of atomic bombs.[45]

The 1975 Asilomar Conference on recombinant DNA technology illustrates how the scientific community has historically addressed such risks through voluntary self-regulation. By recognising the need to limit certain research practices, scientists established safety guidelines without government intervention.[46] This initiative set a precedent for responsible science led by researchers themselves. Yet reproducing such a unified and effective response appears increasingly difficult today. The modern scientific ecosystem is fragmented, with actors ranging from private biotech firms to public institutions and civil society groups. Rapid technological change and competing interests now challenge the feasibility of consensus-based self-regulation.[47] This reality raises a pressing question: can voluntary self-regulation suffice and should we reconceive it through the lens of human rights – specifically, the right to science?

Long before Asilomar, the scientific community began addressing the dual-use dilemma through ethical standards and professional codes. These efforts culminated in documents such as the Nuremberg Code,[48] the Helsinki Declaration[49] and UNESCO's recommendations,[50] which

[45] See also Donders and Plozza, *supra* note 7.

[46] 'Asilomar Conference on DNA Recombinant Molecules', 255 *Nature* (1975) 442; Boggio, *Responsible Anticipation*, The GESDA 2023 Science Breakthrough Radar® (2023).

[47] Berg, 'Asilomar 1975: DNA Modification Secured', 455 *Nature* (2008) 290; 'After Asilomar', 526 *Nature* (2015) 293.

[48] International Military Tribunal for the Trial of German Major War Criminals, Judgment of the International Military Tribunal for the Trial of German Major War Criminals, *The Nuremberg Code*, 1947.

[49] World Medical Association (WMA), WMA Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects, 2000.

[50] UN Educational, Scientific and Cultural Organization (UNESCO), *Recommendation on the Status of Scientific Researchers*, 18 C/Resolutions (1974) 169 ff; *Recommendation on Participation by the People at Large in Cultural Life and Their Contribution to It* (1976); See, for example, Universal Declaration on the Human Genome and Human Rights, SHS/BIO/PI/2017/1, Universal Declaration on the Human Genome and Human Rights, 11 November 1997; International Declaration on Human Genetic Data, SHS/BIO/PI/2017/1, 16 October 2003; Universal Declaration on Bioethics and Human Rights, SHS/EST/BIO/06/1, SHS.2006/WS/14, 19 October 2005; *Declaration on Ethical Principles of Climate Change*, 39 C/RESOLUTIONS (2017); *UNESCO Recommendation on Science and Scientific Researchers*, Doc 39 C/Res 85 (2017); *Recommendation on the Ethics of Artificial Intelligence*, SHS/BIO/PI/2021/1 (2022); UN Educational, Scientific and Cultural Organization (UNESCO) and International Council for Science (ICSU), Declaration on Science and the Use of Scientific Knowledge, 30 C/15, 1 July 1999; World Commission on the Ethics of Scientific Knowledge and Technology (COMEST)

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emphasise researchers' rights and responsibilities in ethical dilemmas and dual-use scenarios.[51]

Human rights treaties, while primarily binding upon states, extend their normative reach beyond public authorities. Art. 29 UDHR explicitly refers to 'duties to the community' and its preamble – alongside those of the ICESCR and ICCPR – makes clear that these instruments are addressed not only to states but to 'every individual and organ of society'. This inclusive language implies that human rights obligations are not the exclusive domain of states. Furthermore, Art. 30 UDHR and Common Art. 5(1) of the ICESCR and ICCPR clarify that no actor, whether a state, group or individual, may use the rights enshrined in these treaties to undermine the freedoms of others. Together, these provisions affirm that non-state actors, including researchers, also bear responsibilities within the human rights framework.

This has direct implications for the practice of scientific self-regulation. Although self-regulation is often framed in ethical terms, its legal underpinnings in human rights law – especially in the right to science – remain underexamined. A rights-based approach positions scientific freedom not as absolute, but as conditioned by responsibilities to society and obligations to safeguard other human rights.[52] It thus provides a legal foundation for the expectation that researchers regulate their conduct in accordance with broader human rights concerns.

The right to science embodies this dual structure of rights and duty. It supports the view that ethical codes and professional standards should not merely be voluntary aspirations but must reflect human rights principles. Integrating the right to science into scientific self-regulation

and UN Educational, Scientific and Cultural Organization (UNESCO), *The Precautionary Principle*, SHS.2005/WS/21 (2005) 52.

[51] For example, the UNESCO Recommendation on Science and Scientific Researchers highlights the civic and ethical aspect of scientific research, by expressly stating that researchers should 'express themselves freely and openly on the ethical, human, scientific, social or ecological value of certain projects, and in those instances where the development of science and technology undermine human welfare, dignity and human rights or is "dual use", they have the right to withdraw from those projects if their conscience so dictates and the right and responsibility to express themselves freely on and to report these concerns'. UN Educational, Scientific and Cultural Organization (UNESCO), *supra* note 50, at 16(a) (iii).

[52] For example, the right to be protected from the adverse effects of science (see Section 5.4.1.1c), the prohibition of torture or cruel, inhuman or degrading treatment concerning scientific experimentation (Art. 7 ICCPR, see Section 4.2.5) and the right to freedom of opinion and expression (Art. 19(3) ICCPR, see Section 4.2.7), which carries special duties and responsibilities.

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enhances both its ethical legitimacy and its legal coherence. In doing so, it ensures that scientific progress remains attuned to human dignity, justice and the collective good. Researchers, by virtue of their agency and expertise, carry a responsibility to ensure that their pursuit of knowledge does not compromise the rights of others. Within this framework, scientific self-regulation is not just advisable – it becomes a legal and moral imperative grounded in international human rights law.

8.4 Conclusion

In conclusion, revisiting the 'shield and sword' analogy underscores the multifaceted role of limitations within the framework of international human rights law, particularly as they apply to the right to science under the ICESCR. This chapter has shown how limitations operate not only to protect individuals and society from potential harms (the shield) but also to enable the lawful restriction of rights when necessary for the general welfare (the sword).

While limitations on the right to science are permissible, they must meet stringent criteria: they must be lawful, consistent with the nature of the rights concerned, proportionate and aimed at promoting the general welfare in a democratic society. This balancing act reflects a central tenet of human rights law – the reconciliation of individual freedoms with collective well-being. The chapter also clarified key distinctions between limitations and other legal concepts, such as retrogressive measures, and compared the ICESCR's limitations regime to that of the ICCPR.

Beyond legal constraints, the chapter examined the role of ethical self-regulation in scientific research. While traditionally grounded in professional codes and moral reasoning, such self-regulation increasingly finds normative support in international human rights law. In particular, the right to science offers a framework for understanding the responsibilities of researchers as not only ethical but also legal in nature.

In this light, self-regulation in science is not merely a professional ethic – it is a responsibility grounded in international human rights law. It ensures that the pursuit of knowledge remains compatible with human dignity and societal values. By situating scientific integrity within the legal architecture of human rights, the right to science offers a holistic model for guiding scientific progress, one that honours both the autonomy of researchers and the rights of those affected by their work. Thus, limitations serve not only to constrain but also to orient science towards the public good – affirming their function as both shield and sword.

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