
Committee on Economic, Social and Cultural rights**Draft General Comment****Science and economic, social and cultural rights
Art. 15: 15.1.b, 15.2, 15.3 and 15.4¹****Draft prepared by Rodrigo Uprimny and Mikel Mancisidor****I. Introduction and basic premises**

1. Science has deep social impacts as it affects almost all aspects of human life. This impact is, however, ambivalent. On one hand, science is an extraordinarily powerful tool for advancing human development and promoting the enjoyment of Economic, Social and Cultural Rights (Hereinafter: ESCR). On the other hand, some developments of science and technology can sometimes have a negative impact on the enjoyment of ESCR, for example when they are placed in the service of war and destruction or when they result in new health or environmental risks. Additionally, access to the benefits of science is very unequally distributed across the world and within countries, sometimes due to the operation of intellectual property (Hereinafter IP).

2. The intense and rapid development of science and technology, their ambivalent effects on human life and the unequal distribution of their benefits have prompted serious ethical and legal discussions in the last decades. This explains the existence of rich and growing academic literature on the relationship of science and ESCR² and the adoption of several important documents on this issue, such as the so-called “Venice Statement”,³ the 2005 UNESCO Declaration on Bioethics and Human Rights,⁴ the 2017 UNESCO

¹ The Committee authorized the dissemination of this draft for external comments, until February 14th 2020.

² See A. R. Chapman (2009), “Towards an Understanding of the Right to Enjoy the Benefits of Scientific Progress and Its Applications”, *Journal of Human Rights*, vol. 8, no 1; Y. Donders (2011), “The Right to Enjoy the Benefits of Scientific Progress: in Search of State Obligations in relation to Health”, vol. 14, no 4; C. Timmermann (2014), “Sharing or Benefiting from Scientific Advancement?” in *Science and Engineering Ethics*. See also H. Porsdam (2019), *The Transforming Power of Cultural Rights*, Cambridge University Press; L. Shaver (2010), “The Right to Science and Culture”, *Wisconsin Law Review* n° 1, 121-148; O. De Schutter (2011), “The Right of Everyone to Enjoy the Benefits of Scientific Progress: From Conflict to Complementarity” in *Human Rights Quarterly*, No 33, 304-330.

³ Venice Statement on the Right to Enjoy the Benefits of Scientific Progress and its Applications (17th July 2009) SHS/RSP/HRS-GED/2009/PI/H/1 (Hereinafter: The 2009 Venice Statement).

⁴ Universal Declaration on Bioethics and Human Rights, Resolution 15 adopted by the General Conference of UNESCO at its thirty-third session (21st October 2005) (33 C/Res. 15) (Hereinafter: The 2005 Universal Declaration on Bioethics).

Recommendation on Science and Scientific researchers,⁵ the reports of the special rapporteur on cultural rights⁶ or our 2005 General Comment 17 on “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”.

3. In spite of all these developments, science is one of the areas of the Covenant that State Parties give least attention to in their reports and dialogues with the Committee. These circumstances have led this Committee, after a wide consultative process, to develop this General Comment on the relationship between Science and ESCR, which aims at assisting States Parties in the implementation of the rights of the Covenant related to science. This General Comment also seeks to provide guidance to the United Nations specialized bodies and other human rights mechanisms and will be useful for Human Rights organisations, scientific organisations, universities and scientists, as well as civil society as a whole, including corporations, to have a better understanding of their rights and obligations in relation to science.

4. The Committee focuses on the “right of everyone to enjoy the benefits of scientific progress and its applications” (art. 15.1.b) as it is the right most frequently invoked in the discussions on the relationship between science and ESCR. However, this right cannot be interpreted in isolation. It is linked to other rights and obligations enshrined in the Covenant related to science and with article 27 of the Universal Declaration of Human Rights (Hereinafter: the UDHR).

II. Normative content

“Scientific progress and its applications”

5. This General Comment retains a definition of science that is based on that adopted by UNESCO in its 2017 “Recommendation on Science and Scientific Researchers”.

6. UNESCO defines science as “the enterprise whereby humankind, acting individually or in small or large groups, makes an organized attempt, by means of the objective study of observed phenomena and its validation through sharing of findings and data and through peer review, to discover and master the chain of causalities, relations or interactions; brings together in a coordinated form subsystems of knowledge by means of systematic reflection and conceptualization; and thereby furnishes itself with the opportunity of using, to its own advantage, understanding of the processes and phenomena occurring in nature and society”. The 2017 UNESCO Recommendation adds that the term “the sciences” signifies “a complex of knowledge, fact and hypothesis, in which the theoretical element is capable of being validated in the short or long term, and to that extent includes the sciences concerned with social facts and phenomena”.⁷

7. Thus, science, which encompasses natural and social sciences, refers both to a process following a certain methodology (doing science) and to the results of this process (knowledge, applications). Though other forms of knowledge may claim protection and promotion as a cultural right, knowledge should only be considered as science if it is based on critical inquiry and open to falsifiability and testability. Knowledge which is solely based on tradition or revelation or authority, without the possible contrast with reason and experience, or which is immune to any falsifiability or intersubjective verification, cannot be considered science.

8. The UDHR refers to “scientific advancement”, and the Covenant refers to “scientific progress”; these expressions emphasize the capacity of science to contribute to the well-being

⁵ Recommendation on Science and Scientific Researchers of the Resolution 15 adopted by the General Conference of UNESCO at its thirty-ninth session (13th November 2017) (39 C/Res.15) (Hereinafter: The 2017 UNESCO Recommendation).

⁶ Report of the Special Rapporteur in the field of cultural rights Ms. Farida Shaheed on the right to enjoy the benefits of scientific progress and its applications, presented at the twentieth session of the Human Rights Council (14 May 2012) (A/ HRC/20/26) (Hereinafter: the 2012 Report of the Special Rapporteur on Cultural Rights).

⁷ See the 2017 UNESCO Recommendation, Par 1.a.ii.

of people and peoples. Science in the service of progress, the universal enjoyment of human rights and human development should be prioritized.

9. Applications refer to the particular implementation of science to the specific concerns and needs of the population. This is what is known as applied science. Applications also include the technology deriving from scientific knowledge, such as the medical applications, the industrial or agricultural applications, or the information and communication technologies.⁸

“Enjoy the benefits”

10. The term “benefits” refers first to the material results of scientific research, such as medicines, vaccination, fertilizers, technological instruments and so on. Secondly, benefits refer to the scientific knowledge and information directly deriving from scientific activity. Science provides benefits not only because of its material results but also through the development and dissemination of the knowledge itself. Finally, benefits refer not only to results, knowledge and information, but also to science’s role in forming critical and responsible citizens who are able to participate fully in a democratic society, both via formal and informal education.⁹

“Take part in cultural life”

11. The right to enjoy the benefits of scientific progress cannot be interpreted in a restrictive manner that establishes a rigid distinction between the scientist who produces science and the general population entitled only to enjoy benefits derived from research conducted by scientists. This restrictive interpretation, even if based on the plain language of article 15.1.b, would be contrary to a systematic and teleological interpretation of this right, which takes into account the context, the object and the purpose of this provision, in accordance with article 31 of the Vienna Convention on the Law of Treaties. The context includes other provisions of the Covenant, including the preamble, and other international legal instruments clearly related to the Covenant, such as the UDHR.

12. Science is not separate from but should be understood as a component or an aspect of “cultural life”, which is an “inclusive concept encompassing all manifestations of human existence.”¹⁰ Cultural life is larger than science as it includes other aspects of human existence, such as arts or literature; it is however reasonable to include scientific activity in cultural life. Thus, the general right of everyone to take part in cultural life includes the right of every person to take part in scientific endeavors and in decisions concerning the developments of science.

13. This interpretation is also implied by the expression “to enjoy the benefits of scientific progress”, which are not restricted to the material benefits or products of scientific advancement but includes the development of the critical skills and mental faculties associated with making science. Thus, one of the most important way for States to develop and diffuse science and its benefits, as is their obligation according to article 15.2 of the Covenant, is to recognize that any person has a right to take part in scientific endeavours.

14. This understanding is corroborated by the travaux préparatoires concerning the drafting of article 15 of the Covenant and its relationship with the UDHR.¹¹

15. The UDHR is in general relevant to establish the scope of all the rights enshrined in the Covenant, not only because the preamble explicitly mentions the UDHR but also because both Covenants were an effort by the international community to develop in binding treaties

⁸ Technology, according to the 2017 UNESCO Recommendation, is scientific knowledge “as relates directly to the production or improvement of goods or services”.

⁹ See the 2012 Report of the Special Rapporteur on Cultural rights: The benefits of science “encompass not only scientific results and outcomes but also the scientific process, its methodologies and tools”.

¹⁰ CESCR General Comment No. 21, Par 11.

¹¹ See Ben Saul (2016), The International Covenant on Economic, Social and Cultural Rights: Travaux Préparatoires, Volume I: Oxford Public International Law.

the UDHR. In that sense, article 27 of the UDHR, which recognizes a right to take part or participate in scientific advancement and its benefits¹², should be taken into account.

16. Further, a strictly dichotomous approach whereby scientists would have an extensive right to participate in and contribute to scientific development, but the general population would merely have the right to enjoy passively the benefits of scientific progress and its applications, is incompatible with the principles of participation and inclusiveness underlying the Covenant and a systemic reading of Article 15 in the broader context in which it appears. Thus doing science does not only concern scientific professionals but also includes citizen science (ordinary people doing science) and the dissemination of scientific knowledge. State Parties must not only refrain from preventing citizen participation in scientific activities but must also facilitate such participation.

“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”

17. The Committee has already developed the content of this right in its General Comment 17 (2005) stressing the difference between this human right and “most legal entitlements recognized in intellectual property systems”. It is not necessary to repeat all this analysis here. However, the Committee will deal, in Part V, with the complementarities and the normative tensions between IP and the right to benefit from scientific progress.

“The freedom indispensable for scientific research and creative activity”

18. Science requires a robust protection of freedom of research to flourish and develop. Thus the Covenant establishes a specific duty for States to “respect the freedom indispensable for scientific research” (art 15.3). This freedom includes at least the following dimensions: the protection of researchers from undue influence on their independent judgement; their possibility to contribute to the definition of the aims and objectives of the research and the methods to be adopted which should be humanely, scientifically, socially and ecologically responsible; the possibility to express freely and openly on the ethical, human, scientific, social or ecological value of certain projects and the right to withdraw from those projects if their conscience so dictates; the possibility of researchers cooperating with other researchers nationally and internationally; the sharing of scientific data between researchers, with policymakers, and with the public wherever possible.¹³ However, freedom of scientific research is not absolute; some limitations are possible, as dealt with below.

Interdependence with other rights

19. The right to enjoy the benefits of scientific progress and its applications is a human right with an intrinsic value; it has to be fulfilled even if it does not contribute positively to the enjoyment of other rights. However, access to scientific progress and its applications is an essential tool for the realization of other ESCR, as explicitly mentioned by article 11.2 for the right to food. Moreover, the Committee, in several General Comments, has considered science as a component of quality, adequacy or acceptability which are essential elements of many of the Covenant rights. For instance, General Comment 14 considers that “health facilities, goods and services must (...) be scientifically and medically appropriate and of good quality”. The development of science is also strongly linked with the enjoyment of the right to education. Furthermore, other international instruments make an explicit connection between scientific progress and its applications and the enjoyment of human rights, including ESCR, such as the Convention on the Rights of Persons with Disabilities.

III. Elements of the right and limitations

20. The right to benefit from scientific progress contains both freedoms and entitlements. Freedoms include the right to participate in scientific progress and enjoy the freedom indispensable for scientific research. Entitlements include the right to enjoy, without

¹² The English version refers to the right to “share” but the expressions “participar”, “participar” or “участвовать”, appear respectively in the French, Spanish and Russian versions, which are also official texts of the UDHR.

¹³ See the 2017 UNESCO Recommendation, Par 16.

discrimination, the benefits of scientific progress. These freedoms and entitlements imply not only negative but also positive obligations from States. Further, this right contains the following four interrelated and essential elements, the precise application of which will depend on the conditions prevailing in a particular State Party.

A. Elements of the right

21. Availability refers to the services ensuring access to scientific knowledge which everyone can enjoy and use, e.g. libraries, museums, universities, exhibitions, internet networks, etc. States Parties are expected to provide adequate support to scientific research and to the dissemination of scientific knowledge in order to ensure that such knowledge can effectively be relied upon by the population.

22. Accessibility consists in these assets and services being physically, financially and culturally accessible without discrimination, both in urban and in rural areas, in the majority and in the minority languages, and for all groups and persons. Thus, States Parties should take measures to ensure fair access by everyone, not only to the process of producing science, but also to its applications and products.

23. Accessibility has four dimensions: first, everyone should have the fair opportunity to participate in the development of science on the basis of their capacity, particularly through the progressive achievement of access to higher education and research positions. Second, States Parties should take steps to ensure that everyone has fair access to the applications of science, particularly when they can be means for the enjoyment of other Covenant rights. Third, information concerning the risks and benefits of science and technology should be accessible. Fourth, non-discrimination: participation in scientific endeavors and access to the scientific information and applications of science must be open to all, especially the most vulnerable or marginalized sectors of the population, in law and in fact, without discrimination on any of the prohibited grounds, including gender, ethnic and indigenous identity, disability, economic conditions and other relevant status.

24. Quality refers to the most advanced, up-to-date and generally accepted science available at the time, which is considered by the scientific community to meet certain minimum standards. This element applies both to the process of scientific creation and to access to the applications and benefits of science.

25. Quality includes freedom of scientific research: States Parties should respect freedom of scientific research and refrain from unduly interfering in the agenda and methods of the scientific community. Quality also includes regulation and certification: States should rely on agreed scientific knowledge, in dialogue with the scientific community, to regulate and certify the circulation of new scientific applications that are meant to be accessible to the general public, ensuring their innocuous character and taking due consideration of the precautionary principle.

26. Acceptability: While recognizing that some ideological, religious or cultural beliefs may be disturbed by the progress of science, efforts must be made to ensure that the results of such research should be explained and its applications disseminated in such a manner as to facilitate their acceptance in different cultural and social contexts, provided that this does not affect their integrity, quality and purpose. Acceptability also implies that all efforts should be made by States Parties to guarantee that scientific education and the products of science are tailored to the particularities of populations with special needs, such as persons with disabilities.

27. Acceptability implies that scientific researches have to incorporate ethical principles in order to ensure that the procedure and results of research respect human dignity, such as those proposed by the Universal Declaration on Bioethics and Human Rights:¹⁴ benefits to research participants and other affected individuals should be maximized and any possible harm to such individuals should be minimized; autonomy and informed consent of participants shall be guaranteed; privacy and confidentiality should be respected; groups or persons in conditions of vulnerability shall be especially protected in order to avoid any discrimination; and cultural diversity and pluralism should be given due regard.

¹⁴ See UNESCO 2005 Universal Declaration on Bioethics.

B. Possibility of limitations

28. Some limits on scientific development and on freedom of scientific research are necessary as science and its applications can, in certain contexts, affect human rights or the general welfare of society. Such limits however should not undermine the freedom necessary for scientific research or infringe on the possibility to benefit from science. Thus, the limits on scientific activity or on the access to its benefits, are at the same time necessary and risky.

29. Some limits are necessary, for instance, when scientific research affects human beings, in order to protect people's dignity, identity and integrity, as well as their right to provide their free and informed consent prior to any intervention in the context of medical interventions. Full information and the right not to participate must be guaranteed, and there must be proportionality between the benefits which may be obtained and the risks assumed. When this research affects specific populations, such as indigenous peoples or ethnic minorities, their right to free, prior and informed consent must be protected. When the research is done in countries or on populations different to those of the researchers, the State of origin must also guarantee the rights and obligations of all parties involved regardless of their nationality or jurisdiction.

30. Any limitation on freedom of scientific research or on the possibility of enjoying the benefits of scientific progress must respect the requirements established in article 4 of the Covenant: first, the limitation has to be determined by law; second, the limitation must promote "the general welfare in a democratic society"; third, any restriction must be compatible with the nature of the right restricted; as understood by the Committee, this means that the limitation shall respect the core content of the right and has to "be proportionate, meaning that the least restrictive measures must be taken when several types of limitations may be imposed."¹⁵

IV. Obligations

A. Obligation of progressive realization

31. States Parties must take steps, to the maximum of their available resources, for the full realization of the right to benefit from scientific progress. While full realization of the right may be achieved progressively, steps towards it must be taken immediately or within a reasonably short period of time, should be deliberate, concrete and targeted, using all appropriate means, particularly including, but not limited to, the adoption of legislative and budgetary measures.

32. In principle, any retrogressive measure in relation to the right to benefit from scientific progress should be avoided.¹⁶ Examples of retrogressive measures include the removal of programs or policies necessary for the conservation, the development and the diffusion of science; the imposition of barriers to education and information on science; the imposition of barriers to citizen participation in scientific activities; the adoption of legal and policy changes that reduce the extent of international collaboration on science, etc. In the exceptional circumstances under which retrogressive measures may be inevitable, States must ensure that such measures are necessary and proportionate, in the sense that the adoption of any other policy or the failure to act would be more detrimental to ESCR. They should remain in place only insofar as they are necessary; they should mitigate inequalities that can grow in times of crisis and ensure that the rights of disadvantaged and marginalized individuals and groups are not disproportionately affected; and they should not affect the minimum core content of the rights protected under the Covenant.¹⁷

¹⁵ CESCR General Comment No. 21, Par 19.

¹⁶ See CESCR General Comment No. 14, Par 32.

¹⁷ CESCR. Statement of 22 July 2016 on "Public debt, austerity measures and the International Covenant on Economic, Social and Cultural Rights".

B. Non-discrimination

33. States Parties are under an immediate obligation to eliminate all forms of discrimination against individuals and groups in the enjoyment of any ESCR. This duty is of particular importance in relation to science because deep inequalities persist in the enjoyment of the right to participate in the benefits of scientific progress. Thus, States must adopt the measures necessary to eliminate conditions and combat attitudes that perpetuate inequality and discrimination in order to enable all individuals and groups to enjoy the right to benefit from scientific progress, without discrimination on any prohibited ground.

34. The duty to eliminate discrimination is a cross-cutting obligation that States should take into account when fulfilling all other obligations. For instance, the duty of States to take steps for the development and diffusion of science (Art 15.2) includes the obligation of States to make all necessary efforts to overcome persistent inequalities in participation in science through culturally and gender-appropriate means of education and communication, with a special aim of allowing the widest participation in science of those populations who traditionally have been excluded from access to science.

35. The duty to combat discrimination has implications on the design and implementation of all policies related to science. For instance, States have to carefully design and implement scientific education programs in order to allow all persons equal opportunities for the initial education and training needed to qualify for scientific careers, as well as ensure that all those who qualify enjoy equal access to available employment in scientific research.¹⁸

C. Special protection for specific groups

36. State Parties should take into consideration the special situation of certain groups of persons who have been traditionally discriminated against in their participation in the enjoyment of the benefits of scientific progress. Temporary special measures are necessary to remediate past inequalities and patterns of exclusion of these groups, actively encourage women and persons of other underrepresented groups to consider careers in sciences, and to eliminate biases against these groups. Without prejudice to the duty of States to eliminate discrimination in relation to all groups, special attention should be paid to women, persons with disabilities and low-income persons.

Women

37. Women are often underrepresented in scientific activity. Sometimes this is due to situations of direct discrimination in the access to education or professional employment and promotion. In other cases, discrimination is more subtle and based on stereotypes or professional practices which discourage women's participation in science. In particular, women's advancement in a scientific career, both in academia and in industry, is cumulatively limited as they climb the hierarchical ladder.

38. Unequal access between men and women to science implies double discrimination: first, women have the right to participate in scientific research on an equal footing with men; thus, unequal access to scientific education or scientific careers constitutes in principle a discrimination. Second, as women are underrepresented in scientific research, it is very common that scientific research or new technologies is gender biased and not sensitive to the particularities and special needs of women.¹⁹

39. States must immediately eliminate all direct barriers which affect girls and women's access to scientific education and careers. Further, States must take steps to ensure women's substantive equality in access to scientific education and careers, through different policies, such as education of the public to eliminate stereotypes that exclude women from science or the adoption of policies for both men and women to harmonize domestic life with scientific careers. Special temporary measures, such as the establishment of quotas reserved for women in scientific education, might be necessary in order to speed up the attainment of substantive equality in the enjoyment of the right to share in scientific progress.

¹⁸ The 2017 UNESCO Recommendation, Par 13 (b).

¹⁹ See Katarina Hamberg. "Gender bias in medicine" in *Women's Health* (2008) 4(3).

40. A gender-sensitive approach is not a luxury for scientific research but a crucial tool in order that scientific progress and new technologies adequately take into account the special characteristics and needs of women and girls. This approach should not be relegated to the last stages of research but should be incorporated from the first stage of research, such as the choice of the subject and the design of methodologies, and must be present throughout all steps of scientific research and its applications, including during the evaluation of its impacts. Decisions concerning funding or general policies must also be gender-sensitive.

Persons with disabilities

41. Persons with disabilities have suffered deep discrimination in the enjoyment of the right to participate in scientific progress, either because of severe obstacles to access to scientific education and careers, or because the products of scientific progress do not take into account their particularities and special needs.

42. States Parties should adopt measures and policies to overcome these forms of discrimination in order to achieve inclusive equality for persons with disabilities in the enjoyment of science and its products. These measures should at least include the following aspects: i) promotion of the participation of persons with disabilities through their representative organizations in decision-making procedures concerning science; ii) development of statistics on access to science and its benefits disaggregated by disability; iii) implementation of universal design for products of science and technology that meet the special needs of persons with disabilities; iv) promotion of technologies that facilitate access to scientific education and employment for persons with disabilities; v) taking of all appropriate steps to ensure that reasonable accommodation is provided for persons with disabilities for having access to scientific education and employment and to ensure they benefit from the products of scientific development; vi) adoption of appropriate measures to raise awareness of the capabilities and contributions of persons with disabilities and to combat stereotypes prejudices and harmful practices relating to these persons.²⁰

Low-income persons, inequality and science

43. In the last decades, economic inequality has increased leading to extreme inequalities, which undermine the Rule of Law and have deep negative effects on the enjoyment of ESCR.²¹ In particular, economic inequality hinders equal access to scientific education and to the benefits of scientific progress for low-income households and especially for persons in poverty. This in turn reinforces economic inequalities because high-income persons can enjoy better scientific education and can access the latest and most expensive scientific innovations. These allow them to become more technologically proficient and productive than poor people, perpetuating inequalities and providing them with some legitimacy. This vicious circle might become even more problematic due to the potential impact that the merging of biotechnology and AI can have, as these technologies might make it possible, in a not so distant future, to translate economic inequality into a kind of biological inequality.²²

44. As equality is at the core of human rights, States Parties must exert all efforts to break this vicious circle between extreme economic inequality and unequal access to the right to participate in scientific development. This implies a threefold strategy: first, States Parties should adopt policies to reduce extreme inequality, a subject that goes beyond the scope of this General Comment but which is at the core of current discussions on development, democracy and human rights.²³ Second, States Parties need a specific strategy to strengthen access to good scientific education for low-income persons and access to the most important technological innovations. Third, as many of the new inequalities are strongly linked to the capacity of some business entities to access, store and exploit massive data, it is crucial to regulate, according to human rights principles, the ownership of data.

²⁰ See Convention on the Rights of Persons with Disabilities, in particular articles 1 to 9.

²¹ See Special rapporteur on extreme poverty and human rights. Report to the Human Rights Council. May 2015. A/HRC/29/31.

²² See Yuval Harari. 21 Lessons for the 21st Century. London, Jonathan Cape, p 75.

²³ See Special rapporteur on extreme poverty and human rights. Report to the Human Rights Council. May 2015.

D. Obligations to respect, protect and fulfil

45. States Parties have an obligation to respect, protect and fulfil the right of everyone to participate in the benefits of scientific progress.

46. The obligation to respect requires that States Parties refrain from interfering directly or indirectly in the enjoyment of this right. Examples of the obligation to respect are: ensuring that there are no barriers to access, without discrimination, to education and a scientific career which must be based mainly on criteria of competence and merit, except in relation to temporary measures for achieving substantive equality; the elimination of censorship or limitations on access to the Internet which affect access to and dissemination of scientific knowledge; eliminating obstacles to international collaboration among -scientists, unless where such obstacles may be justified, in accordance with article 4 of the Covenant, as necessary for promoting general welfare in a democratic society.

47. The obligation to protect requires States Parties to adopt measures to prevent other actors from interfering with the right through conduct such as preventing access to knowledge, discrimination that affects participation on the grounds of gender or other circumstances, etc. These actors may include universities, schools, laboratories, cultural or scientific associations, etc. Examples of this duty to protect are: ensuring that scientific associations, universities, laboratories or other non-state actors do not apply discriminatory criteria restricting access or promotion; protecting the people from researches or tests which contravene the basic principles of the medical profession.

48. Sometimes State Parties may have to protect people within their own familial, social or cultural context when their right to share in science is affected. Sometimes parents may decide not to vaccinate their children on grounds the scientific community considers false. Such refusal to vaccinate may entail risks for the child and sometimes even for society, given the risk of the resurgence of diseases that have already been controlled or have come close to being eradicated. On occasion people may be subject to great pressure from their social environment to undergo traditional treatment instead of benefitting from the best available medical attention. States Parties must guarantee everyone the right to choose the treatment they want with the full knowledge, the best information and complete freedom. People who, due to their age or capacity, cannot choose for themselves, must receive special protection. States Parties must also establish protective measures in relation to messages from certain pseudoscience which, often due to purely economic interests, create ignorance and false expectations among the most vulnerable parts of the population.

49. The duty to fulfil requires that States adopt measures, whether legislative, administrative, budgetary or others, aimed at the full enjoyment of the right, which includes education policies, grants, participation tools, dissemination, providing access to the Internet and other sources of knowledge and participation in international cooperation programs, and ensuring appropriate financing.

50. The duty to fulfil is reinforced and specified by article 15.2 of the Covenant, which establishes that these steps “shall include those necessary for the conservation, the development and the diffusion of science”. States Parties not only have a duty to allow persons to participate in scientific endeavors or benefit from scientific progress but also have a positive duty to actively promote the advancement of science through, *inter alia*, education and investment in science and technology. This includes approving policies and regulations which foster scientific research, allocating appropriate resources in the budgets and, in general, creating an enabling and participatory environment for the conservation, development and diffusion of science and technology, which implies *inter alia* academic and scientific freedom, including freedoms of opinion and expression, to seek, receive and impart information, freedom of association and movement; equal access and participation of all public and private actors; and capacity-building and education.²⁴

51. All countries must contribute, within their means, towards this common task of developing science. Recommending that the poor countries focus exclusively on applied science may at first seem appropriate according but it actually increases the gap and unfair distribution of knowledge and power, thereby condemning the countries to dependence. The Scientific Advisory Board of the United Nations, in a report backed by UNESCO, called on

²⁴ See Venice Statement, Par 13.

all countries, including the poorest, to invest at least 1% of their GDP on research and urged the most advanced countries to spend at least 3% of their GDP on research and development.²⁵

52. The importance of the duty of States to disseminate science cannot be underestimated. Basic knowledge of science, its methods and results, has become an essential element for being a competent citizen and for the exercise of other rights, such as access to decent work. Thus, States must exert all efforts to ensure equitable and open access to scientific literature, data and contents including by removing barriers to publishing, sharing and archiving scientific outputs.²⁶

53. As a consequence of freedom of research and the duty of States to disseminate science, scientist have, in principle, the right to publish the results of their research. Any restriction on this right should be compatible with article 4 of the Covenant. In particular, States should ensure that any contractual restriction on this right is consistent with public interest and with appropriately crediting and acknowledging contributions of scientific researchers to the results obtained.

E. Core obligations

54. Core obligations ensure the satisfaction of the minimum essential levels of each right, without which human dignity is severely impaired and the right loses its essence and meaning. Core obligations are therefore not of progressive, but of immediate realization. In order for a State party to be able to attribute its failure to meet at least its minimum core obligations to a lack of available resources, it must demonstrate that every effort has been made to use all resources that are at its disposal in an effort to satisfy, as a matter of priority, these minimum obligations.

55. The determination of core obligations depends on the text of the Covenant and the nature of the right. As the Covenant is a living instrument, the determination of core obligations should also be guided by contemporary human rights instruments, jurisprudence, authorized doctrine, the practice of States and declarations, guidelines and protocols adopted by UN agencies, which show the development of an international consensus in relation to certain values and obligations. In the case of science, declarations and recommendations adopted by UNESCO play a very important role.

56. States parties have a core obligation to ensure the satisfaction of the following minimum essential levels of the rights related to science:

- To eliminate laws, policies and practices that unjustifiably undermine access by individuals or particular groups to facilities, services, goods and information related to science, scientific knowledge and its applications;
- To identify and eliminate any law, policy, practice, prejudice or stereotype that undermines women's and girls' participation in the scientific and technological area: from education to professional activities, especially combating every stereotype on women's different capabilities for any scientific speciality or activity;
- To adopt and implement a national strategy and action plan, to progressively foster citizens' access to and participation in science, through a participatory, non-discriminatory and transparent process;
- To develop a strategy for the conservation, the development and the diffusion of science;

²⁵ See The Future of Scientific Advice to the United Nations, A Summary Report to the Secretary-General of the United Nations from the Scientific Advisory Board, which was presented to Ban Ki-moon by Irina Bokova, Director-General of UNESCO, together with members of the Scientific Advisory Board, on 18 September. Accessed June 2019, available at http://www.unesco.org/new/en/media-services/single-view/news/un_report_calls_for_a_greater_place_for_science_in_internati/.

²⁶ The 2017 UNESCO Recommendation, Pars 13(c) and 36.

- To protect people from harmful consequences of pseudoscience-based practices, especially when minors' rights are at risk, such as the denying of vaccination when needed;
- To ensure that scientific education in both public and private schools respect the best scientific knowledge and that religious visions, when necessary, are presented in a different field;
- To remove limitations to the freedom indispensable for scientific research and creative activity other than those accepted by article 4 of the Covenant;
- To foster the development of international contacts and co-operation in the scientific field, without imposing on movements of persons, goods and knowledge more limitations than those accepted by article 4 of the Covenant.

V. Special topics of broad application

A. Participation and transparency

57. The principles of transparency and participation are essential to make science objective and reliable, and not subject to interests which are not scientific or are against human rights and the welfare of society.²⁷ Secrecy and collusion are in principle contrary to science at the service of humanity. Thus, States should take measures to avoid risks associated with the existence of conflicts of interest, by creating an environment in which actual or perceived conflicts of interest are adequately disclosed and dealt with, especially those of scientific researchers who give policy advice to policymakers and other public officials.²⁸

58. A clear benefit of scientific progress is that scientific knowledge is used in decision-making and policies, which should, as far as possible, be evidence-based. Thus, States Parties should promote scientific culture, public trust and support for sciences throughout society, in particular through a vigorous and informed democratic debate on the production and use of scientific knowledge, and a dialogue between the scientific community and society.²⁹

59. With due respect to scientific freedom, some decisions concerning the orientation of scientific research or the adoption of certain technical advancements, should be subjected to public scrutiny and citizen participation. As far as possible, scientific or technological policies should be established through participatory and transparency processes and should be implemented with transparency and accountability mechanisms.

B. Participation and the precautionary principle

60. Participation also includes the right to information and participation in controlling the risks involved in certain scientific activities or policies. This is related to the precautionary principle, according to which, in the absence of full scientific certainty, when an action or policy may lead to morally unacceptable harm to the public or the environment, actions shall be taken to avoid or diminish that harm.³⁰ Morally unacceptable harm includes "harm to humans or the environment that is (a) threatening to human life or health, (b) serious and effectively irreversible, or (c) inequitable to present or future generations, or (d) imposed without adequate consideration of the human rights of those affected."³¹

²⁷ Venice Declaration 12.

²⁸ The 2017 UNESCO Recommendation, Pars 9 y 14.

²⁹ The 2017 UNESCO Recommendation, Par 5c and g.

³⁰ UNESCO World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) (2005), The Precautionary Principle, available at <https://unesdoc.unesco.org/ark:/48223/pf0000139578>, accessed 5 November 2019, pp. 12-14.

³¹ UNESCO World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) (2005), The Precautionary Principle, available at <https://unesdoc.unesco.org/ark:/48223/pf0000139578>, accessed 5 November 2019, p. 14.

61. The application of the precautionary principle is sometimes controversial. If applied too broadly, it may prevent scientific progress which is beneficial for humanity; if it is applied too restrictively, potential serious harms to society might be ignored. The precautionary principle should not block scientific development, but neither can it be ignored when important interests are at stake, particularly for human health and the environment. Thus, in these controversial cases, participation and transparency become crucial because the risks and potentials of some technical advances or some scientific researches should be made public in order that society, through an informed, transparent and participatory process, can decide whether or not the risks are acceptable.

C. Privatization of scientific research and IP

62. In the contemporary world, a substantial part of scientific research is carried out by business enterprises and non-State actors.³² This in itself is not incompatible with the Covenant. However, the large privatization of scientific research might have negative effects on the enjoyment of the right to participate in scientific development.

63. In some cases, scientific research made or financed by private actors can create acute conflict of interests, for instance when business corporations support researches related to the type of economic activities in which they are involved. Mechanisms should be established for the disclosure of these actual or perceived conflicts of interest.

64. Privatization of research has been strongly associated with the development of international and national IP legal regimes, which have complex relationships with the right to share in scientific progress. On one hand, IP can enhance development of science and technology through the establishment of economic incentives, such as patents for inventors, which might stimulate involvement of these private actors in scientific research. However, on the other hand, IP can negatively affect the advancement of science and the access of its benefits, at least in three ways.

65. First, IP can create distortions in funding of scientific research as private financial support might go only to research projects that are profitable, while funding for addressing issues which are crucial for the general welfare of society might not receive adequate support. This has been happening, for example, with the lack of funding for research for vaccines or for the treatment of certain tropical diseases which cause immense human suffering but do not seem financially attractive for business. Second, IP can also block the necessary sharing of results of scientific research and its methods, which is crucial for the advancement of science. For instance, patents limit the possibility to access some data for a certain period of time. Further, the excessive price of some scientific publications is an obstacle for low-income researchers, especially in developing countries. Third, in some cases, IP pose very serious obstacles for persons wishing to access the benefits of scientific progress, which might also be crucial for the enjoyment of other ESCR, such as the right to health. Patents give to patent holders a temporary monopoly to exploit the product or service they have invented. Thus, they can impose a price for these products and services. If prices are fixed very high, access to these products and services become impossible for low-income persons or developing countries, as has happened with new medicines that are essential for the health and life of persons with certain diseases.

66. States have to take all steps to avoid the possible negative effects of IP on the enjoyment of the right to share in scientific progress in particular and of all ESCR in general. First, to counter distortions of funding associated with IP, States Parties should provide adequate financial support for research that is important for the general welfare or for the enjoyment of ESCR, either by national effort or, if necessary, by resorting to international and technical cooperation. Second, States should make all efforts, in their national regulations and in international agreements on IP to avoid an “unacceptable prioritization of profit for some over benefit for all”.³³ A balance must be reached between IP and the open access and sharing of scientific knowledge and the access to the benefits of science, especially those linked with the realization of other ESCR, such as the right to health, right to education and

³² Venice Statement, Par 5.

³³ Venice Statement, Par 10.

right to food. The Committee reiterates that “ultimately, intellectual property is a social product and has a social function” and consequently States Parties “have a duty to prevent unreasonably high costs for access to essential medicines, plant seeds or other means of food production, or for schoolbooks and learning materials, from undermining the rights of large segments of the population to health, food and education”.³⁴

D. Local and traditional knowledge. Indigenous peoples and science

67. Local, traditional and indigenous knowledge, especially regarding nature, species (flora/fauna) and their properties, has an important role to play in the scientific global dialogue and development. Science should incorporate all valuable inputs, including from indigenous and local knowledge systems.

68. Important knowledge among indigenous peoples and local communities all over the globe should be integrated in global knowledge and promoted by a larger audience with due credit to its individual or collective authors. States Parties should provide indigenous peoples the means (both education and technology) to participate in this dialogue and take all measures for the respect for their rights, in particular their land, their identity and the moral and material interests resulting from their knowledge, intellectual property rights included. Consultation in order to obtain free, prior and informed consent is necessary, whenever the State party or non-state actors make decisions or create policies related to science that have an impact on indigenous peoples. This process needs to be conducted in a dynamic, continuous and reflexive manner. The format of informed consent, such as a written or signed form, is not a compulsory factor, but the quality of the consent is relevant.³⁵

E. Controlled substances and science

69. Scientific research is impeded for some substances given that they fall under the international conventions on drug control³⁶ and are classified as harmful for health and with no scientific or medical value. However, there is evidence that supports that there are medical uses for many of these substances or that they are not as harmful as they were supposed to be when they were placed under this regime. This is the case of derivatives of opioids (for pain management and opioid maintenance treatment), cannabis (for the case of treatment resistance epilepsy), and MDMA (used in psychotherapy for post-traumatic stress disorder) to the extent of the available scientific evidence. Moreover, the Expert Committee on Drug Dependence (ECDD) from the WHO has recently recommended to de-classify cannabis from the List IV of the 1961 Single Convention, recognizing the medicinal uses and benefits that this substance holds.

70. States Parties should harmonize the fulfillment of their obligations under the international drug control regime with their obligations to respect, protect and fulfill all ESCR and specifically, the right to participate in scientific progress and its benefits, through a permanent revision of its policies in relation to controlled substances. Prohibition of research in those substances or to access them are in principle restrictions to the right so benefit from scientific development and its applications and should meet the requirements of article 4 of the Covenant.

F. Science and right to food

71. Article 11(2)(a) of the Covenant commits States parties to "improve methods of production, conservation and distribution of food", *inter alia*, "by making full use of technical and scientific knowledge (...)". This is one particular example, in the implementation of the right to adequate food, of the more general “right to benefit from scientific progress and its applications”.

³⁴ CESCR General Comment No. 17, Par 35.

³⁵ For Guidelines see e.g. “Principles of Professional Responsibility” by the American Anthropological Association <http://ethics.americananthro.org/category/statement/>.

³⁶ See 1961 Single Convention on Narcotic Drugs, 1971 Convention on Psychotropic Substances and 1988 Vienna Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances.

72. The support States give to agricultural production may take a variety of forms, including both the provision of certain public goods (such as storage facilities, irrigation, communications infrastructures, extension services, and the building of cooperatives among small producers and farmer field schools) and the provision of inputs (seeds, fertilizers, and pesticides). However, the right of farmers to enjoy the benefits of scientific progress and of its applications is intended to support farmers' choice as to which kind of farming methods they wish to rely upon. The environmental impacts of certain technologies associated with the "Green Revolution", as well as the risks associated with an increased dependency on technology providers, has led the General Assembly to acknowledge that "Peasants and other people working in rural areas have the right to *determine their own food and agriculture systems*, recognized by many States and regions as the right to food sovereignty".³⁷ Thus, the right to benefit from scientific progress and from its applications in agriculture should preserve, not close down, the right of peasants and other people working in rural areas to choose which technologies suit them best. Low-input agronomic techniques, that increase soil organic matter content and carbon sequestration, as proposed in particular by agroecology, agroforestry, or conservation agriculture, should therefore also be supported, in order to ensure that farmers have access to a full range of alternatives.³⁸

73. In addition, the beneficiaries should be recognized a right to participate in shaping research and development policies that influence the direction of scientific progress: as regards the breeding of new plant varieties for instance, article 19(7) of the Declaration on the Rights of Peasants and Other People Working in Rural Areas provides that "States shall take appropriate measures to ensure that agricultural research and development integrates the needs of peasants and other people working in rural areas and to ensure their active participation in the definition of priorities and the undertaking of research and development, taking into account their experience, and increase investment in research and the development of orphan crops and seeds that respond to the needs of peasants and other people working in rural areas." Similarly, echoing the provision of farmers' rights of the International Treaty on Plant Genetic Resources for Food and Agriculture,³⁹ article 15(4) of the same Declaration refers to "the right to participate in decision-making processes on food and agriculture policy and the right to healthy and adequate food produced through ecologically sound and sustainable methods that respect their cultures."

74. While technological progress has improved food availability per capita over the past fifty years, too little has been done to ensure adequate nutrition. Even more than undernutrition, inadequate diets have become a major contributing factor to the increase of non-communicable diseases in all regions. Given the proven long-term impacts of adequate nutrition during pregnancy and before the second birthday of the child, both in low-income countries where undernutrition is the major concern and in middle- and high-income countries, States should do more to disseminate information about the benefits of adequate feeding practices, including breast-feeding. They should also redirect investments in agricultural development away from the exclusive focus on boosting the production of cereal crops – rice, wheat and maize – towards support to healthy diets. Cereal crops are mainly a source of carbohydrates and contain relatively few proteins and other nutrients essential for adequate diets. Yet, of the over 80,000 plant species available to humans, these three crops supply the bulk of our protein and energy needs today.⁴⁰ The shift from diversified cropping systems to simplified cereal-based systems has thus contributed to micronutrient malnutrition in many developing countries. As a result, nutritionists now increasingly insist on the need

³⁷ United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas, adopted by UN General Assembly Res. 73/165 of 17 Dec. 2018, art. 15(4) (emphasis added).

³⁸ *The Future is Now. Science for achieving sustainable development*. Global Sustainable Development Report. New York: United Nations, 2019, pp. 68-69. See also IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse gas fluxes in Terrestrial Ecosystems (8 October 2018).

³⁹ International Treaty on Plant Genetic Resources for Food and Agriculture, *adopted* 3 Nov. 2001, Res. 3/2001, FAO, 31st Sess. art. 1.1 (*entered into force* 29 June 2004) (see article 9).

⁴⁰ Frison E et al. (2006). Agricultural biodiversity, nutrition and health: Making a difference to hunger and nutrition in the developing world. *Food and Nutrition Bulletin*, 27(2): 167–179.

for more varied agroecosystems, in order to ensure a more diversified nutrient output from farming systems.⁴¹

G. Risks and promises of the so called 4th industrial revolution

75. Technological change is now so intense and rapid that we might be living a fourth industrial revolution, characterized by the blurring of boundaries between the physical, digital and biological worlds, because of the growing fusion of scientific and technological advancements in areas such as artificial intelligence (AI), robotics, 3D printing, biotechnology, genetic engineering, quantum computers or management of big data. This new industrial revolution has a very deep impact in human life because it might change not only society but even human beings themselves, through genetic engineering or the incorporation in human bodies of technological devices that transform some biological functions.

76. As previous industrial revolutions, the fourth industrial revolution might have positive or negative impacts on the enjoyment of ESCR. For instance, applications of AI in industry or services will lead to enormous gains in productivity and efficiency that have the potential to improve the quality of life; biotechnology can allow the cure or the treatment of many diseases; robotics might allow machines to perform risky jobs previously done by humans, etc. On the other hand, this fourth industrial revolution might intensify social inequalities by increasing segregation in the labor market; algorithms incorporated in AI can reinforce discrimination, etc.

77. States Parties have to adopt policies and measures that expand the benefits of these new technologies while at the same time reducing their risks. However, there are no easy solutions as it is difficult to foresee the concrete developments of this fourth industrial revolution. Nevertheless, for the Committee, two elements remain very important: first, international cooperation should be enhanced in this field as some of the more serious risks of these technologies need global regulations to be effectively managed. Fragmented national responses to these transnational technologies would create governance gaps detrimental to the enjoyment of ESCR and would perpetuate technological divides.

78. Second, decisions concerning the development and use of these technologies should be adopted within a human rights framework and with a holistic and inclusive view⁴². All crosscutting human rights principles, such as transparency, non-discrimination and accountability, and respect for human dignity become crucial in this field. For instance, States Parties should develop mechanisms to permit autonomous intelligent systems to be designed in ways that avoid discrimination, enable their decisions to be explained and allow accountability for their use.⁴³ Additionally, States Parties should establish a legal framework that makes non-State actors, especially business entities, to exercise human rights due diligence in order to identify, prevent and mitigate the risks of violations of Covenant rights,⁴⁴ especially for the Big-Tech companies.⁴⁵ This legal framework should include, for instance, measures that require companies to prevent discrimination at both the input and output levels of AI systems and other technologies.

⁴¹ DeClerck FAJ et al. (2011). Ecological approaches to human nutrition. *Food and Nutrition Bulletin*, 32 (suppl. 1): 41S–50S; International Panel of Experts on Sustainable Food Systems (IPES-Food), *From uniformity to diversity* (2016).

⁴² See Report of the UN Secretary-General's High-level Panel on Digital Cooperation, available in file:///D:/Documentos/DESC%7D/DESC/Ciencia/DigitalCooperation-report-for%20web.pdf.

⁴³ Ibidem.

⁴⁴ See CESCR General Comment No 24 on State obligations under the International Covenant on Economic, Social and Cultural Rights in the context of business activities, Par 16.

⁴⁵ See Special rapporteur on extreme poverty and human rights. Report the General Assembly. October 2019. A/74/48037.

VI. International cooperation

79. All States have a general duty to cooperate internationally towards the fulfilment of all ESCR as established in article 2 of the Covenant and in articles 55 and 56 of the United Nations Charter. This duty is reinforced in the case of scientific activities, as article 15.4 of the Covenant specifically provides that States shall recognize the benefits “derived from the encouragement and development of international contacts and co-operation in the scientific and cultural fields”.

80. The reinforced nature of the duty of international cooperation in the scientific field has several important justifications and dimensions. First, as certain fields of science necessitate a universal endeavour, international cooperation among scientists should be encouraged to foster scientific progress. Thus, States should take all measures necessary to enable scientific researchers to participate in the “international scientific and technological community”,⁴⁶ especially through facilitating their travel in and out of their territory and implementing policies that enable scientific researchers to freely share data and educational resources internationally, for example, by means of virtual universities.⁴⁷

81. Second, this international cooperation is also essential because of the existence of deep international disparities among countries in the field of science and technology. Developing States, if necessary because of financial or technological constraints, should resort to international assistance and cooperation, with a view to complying with their obligations under the Covenant. Developed States should contribute to the development of science and technology in developing countries, adopting measures to achieve this purpose, such as promoting collaboration between scientific communities of developed and developing countries to meet the needs of all countries and facilitate their progress while respecting national regulation. Benefits resulting from any research and its applications should be shared with the international community, in particular with developing countries. Developed States should also implement policies for identifying and countering the effects of brain drain.⁴⁸

82. Third, international cooperation is essential because the most acute risks of the world related to science and technology, such as climate change, the development of dangerous technologies, such as the development of autonomous weapons based on AI, the threat of weapons of mass destruction, especially nuclear weapons, or the risks of pandemics, cannot be adequately addressed without robust international cooperation. States should promote multilateral agreements to prevent these risks from materializing or to mitigate their effects.

83. States also have extraterritorial obligations for the full realization of the right to participate in science. In particular, States Parties, when negotiating international agreements or adopting their domestic IP regime, should ensure that sources and products of traditional knowledge are protected, contributions to scientific knowledge are appropriately credited and that IP regimes do not block the enjoyment of the right to participate in the benefits of scientific progress.⁴⁹ These bilateral and multilateral agreements should enable developing countries to build up their capacity to participate in generating and sharing scientific knowledge. States should also take measures in cooperation with other States against biopiracy; illicit trafficking of organs, tissues, samples, genetic resources and genetic-related materials.⁵⁰

VII. National implementation of the right

84. While States Parties have a wide margin of discretion in selecting the steps and policies to achieve the full realization of all ESCR,⁵¹ including the right of everyone to share the benefits of scientific progress, at least four types of measures should be implemented.

85. First, States have to put in place a normative framework that ensures the full enjoyment of the right and that creates an enabling and participatory environment for the

⁴⁶ The 2017 UNESCO Recommendation, Par 31.

⁴⁷ The 2017 UNESCO Recommendation, Par 18.

⁴⁸ The 2017 UNESCO Recommendation, Par 18.

⁴⁹ The 2017 UNESCO Recommendation, Par 18.

⁵⁰ The 2017 UNESCO Recommendation, Par 18.

⁵¹ See CESCR General Comment No. 21, Par 66.

conservation, development and diffusion of science and technology. This framework should include, *inter alia*, the protection of freedom of research and the restrictions that are compatible with article 4 of the Covenant; measures to ensure that ethics and human rights are respected in scientific research, including the establishment of committees on ethics when necessary; the protection of the scientific and technological results of scientific researchers; measures to harmonize intellectual property with the right of all persons to access science and its benefits; and adequate protection against all forms of discrimination.

86. Second, States Parties have to develop a national plan of action to promote scientific progress and to disseminate its results and products to all persons without discrimination. Without undermining scientific freedom, a national plan of action for science and technology will ensure that different scientific endeavors are not carried out in isolation and without coordination, but are part of a State's integrated efforts for the promotion, conservation and diffusion of science. This plan of action should include, *inter alia*, measures to strengthen human and institutional scientific capacities in the State; adequate public funding, especially for researches which are relevant for the needs of the population and for the promotion of access to scientific education, especially for groups traditionally discriminated in this field; mechanisms to promote a scientific culture, public trust and support for sciences in society, in particular through a vigorous and informed democratic debate on production and use of scientific knowledge, and a dialogue between the scientific community and society; measures to ensure ethics in science, such as the establishment or promotion of independent, multidisciplinary and pluralist ethics committees to assess the relevant ethical, legal, scientific and social issues related to research projects; and measures to enhance the professional and material conditions of scientific researchers.⁵²

87. Third, in their national strategies and policies, and especially in the national plan for science and technology, States Parties should identify appropriate indicators and benchmarks, including disaggregated statistics and time frames that allow them to monitor effectively the implementation of the right of everyone to share in scientific progress, and also to assess progress towards the full realization of this right.

88. Fourth, like all other rights, the right to share in scientific progress is enforceable and therefore also justiciable.⁵³ States Parties should provide for the establishment of effective mechanisms and institutions, where these do not exist, to prevent violations of the right and to ensure effective judicial, administrative and other remedies for victims if such violations occur. As this right can be threatened or violated not only by actions of the State but also through omissions, remedies must be effective in both cases.

A human right to science

89. This set of rights, entitlements, liberties, duties or obligations related to science, analyzed in this General Comment, might be brought together in a single broad concept named the human right to science, in the same way that, for example, the human right to health encompasses a set of rights and freedoms. This approach and name has already been adopted by the Special Rapporteur on Cultural Rights,⁵⁴ by UNESCO, by some international conferences and summits⁵⁵ and by some important scientific organizations and publications.⁵⁶

⁵² The 2017 UNESCO Recommendation, Pars 4, 5, and 6.

⁵³ See CESCR General Comment No. 9.

⁵⁴ See the 2012 Report of the Special Rapporteur on Cultural Rights Report.

⁵⁵ Declaration by the head of States and governments. XXVI Cumbre Iberoamericana de Jefes de Estado y de Gobierno at <https://www.segib.org/?document=declaracion-de-la-xxvi-cumbre-iberoamericana-de-jefes-de-estado-y-de-gobierno>.

⁵⁶ SCIENCE, Editorial nov.2018: Define the Human Right to Science: <https://science.sciencemag.org/content/362/6418/975>.