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Forever chemicals and human rights

Report of the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes, Marcos Orellana

Summary

In the present report, submitted pursuant to Human Rights Council resolution 54/10, the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes examines how per- and polyfluoroalkyl substances (PFAS) impair the effective enjoyment of human rights. He explores how these highly persistent chemicals that lack analogues in the natural world have the potential to irreversibly alter the chemical composition of life-supporting ecosystems and impair human and environmental health. He concludes that PFAS pose a profound threat to human rights and the environment that compels an immediate ban of all non-essential uses of PFAS and urgent action at every level to effectively control PFAS and prevent PFAS pollution.

I. Introduction

1. Human intelligence, ingenuity and industry, or accidents, have created new matter in the form of molecules that do not have analogues in the natural world. One such class of novel chemicals are per- and polyfluoroalkyl substances (PFAS). These chemicals, which number over 10,000 substances in the class, are engineered to confer specific functional properties to materials and products. PFAS are highly persistent and virtually indestructible, and they have come to be known as "forever chemicals".

2. The Organisation for Economic Co-operation and Development (OECD) has defined PFAS as fluorinated substances that contain at least one fully fluorinated methyl or methylene carbon atom, without any H/Cl/Br/I atom attached to it.[1] The strong connection between carbon and fluorine, known as the C–F bond, gives PFAS thermal and chemical stability, which leads to their strong resistance to heat, water, oil and degradation.

3. Once released into the environment, PFAS spread and accumulate in the environment. There are no effective and scalable technologies available to remove PFAS from contaminated ecosystems. As highly persistent chemicals, the timescales of their impacts extend from decades to centuries and millennia. Thus, once released, PFAS cause accumulating and irreversible changes to the chemical composition of planet Earth.

4. PFAS can travel long distances through water and air currents, increasing potential human exposure beyond their point of origin. PFAS are also found in a myriad of industrial and consumer products that enter international commerce, many of which release these chemicals when used and disposed of. Moreover, PFAS are added to plastics, contaminating plastic waste that is often transported across boundaries and then dumped or burned. These movements and practices release PFAS to water, air and soil, causing irreversible pollution, which inevitably ends up in plants, animals and ultimately people throughout the planet. Thus, PFAS pose a global environmental threat that concerns not only industrialized countries that produce PFAS and are experiencing the proliferation of contaminated sites and communities, but also developing countries that lack the capacities to prevent PFAS pollution in their territories.

5. In addition to causing irreversible alterations of ecosystems, scientific evidence has revealed that many PFAS are hazardous to human and environmental health. The release of PFAS thus aggravates the planet's toxification and undermines the effective enjoyment of human rights. This raises profound environmental justice issues and underscores the importance of the customary duties to prevent significant harm to the environment and to cooperate for the protection of the environment.[2]

6. The presence of fully fluorinated carbon in all members of the class and their potential risks, including causing deleterious health effects and irreversible environmental harm, raises policy questions on how the class of PFAS should be treated. These questions highlight the role of the precautionary principle in guiding States in decision-making under conditions of uncertainty to prevent toxic exposure and significant environmental harm.[3]

7. The international community has previously responded to scientific evidence of how certain synthetic chemicals threaten vital ecosystem functions or human health. For example, persistent chlorofluorocarbons employed in refrigeration and other important uses were found to deplete the ozone layer that protects humans, plants and others from hazardous ultraviolet radiation. Similarly, persistent polychlorinated biphenyls used in electric equipment were found to impair endocrine and other vital functions in living organisms. These hazardous substances have been subject to international controls and cooperation that have been largely effective in confronting their risks and harms. PFAS present similar challenges to the international community.

[1] OECD, *Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance*, Series on Risk Management, No. 61 (Paris, 2021), p. 8.

[2] International Court of Justice, *Obligations of States in respect of Climate Change, Advisory Opinion*, 23 July 2025, paras. 134 and 142.

[3] Ibid., para. 294.

8. In the present report, the Special Rapporteur examines how PFAS impair the effective enjoyment of human rights. He first examines the chemical properties and uses, exposure pathways and adverse impacts of this class of chemicals. He then interrogates the global environmental justice and ethical dimensions of PFAS production and release. Next, he documents adverse human rights impacts of PFAS exposure on workers, individuals and communities. Before concluding and presenting recommendations, he reviews multilateral and national-level responses to date.

9. The present report is informed by a broad consultative process in which the Special Rapporteur requested and received input from States, international organizations, Indigenous Peoples, non-governmental organizations, businesses and academics. [4] The Special Rapporteur also organized an in-person consultation at the United Nations Environment Assembly, held in Nairobi in December 2025, and two online consultations in January and February 2026. The Special Rapporteur is grateful to those who shared their expertise and insights.

II. Per- and polyfluoroalkyl substances

10. PFAS are not naturally occurring substances; rather, they are a class of human-made chemicals that are highly persistent and capable of long-range environmental transport. Characterized by high mobility, low absorption potential and, in many cases, high water solubility, PFAS move through the environment and accumulate in ecosystems. [5] Temperatures of over 1,400°C are required to eliminate them and even at those high temperatures, some PFAS persist.

11. PFAS can cross the human placenta and have been detected in umbilical cord blood and breast milk. Fetuses and infants are thus exposed at particularly sensitive stages of development and may accumulate higher doses relative to their body weight.[6] Communities living near industrial or military facilities manufacturing or using PFAS or products containing PFAS demonstrate higher PFAS blood levels compared to the general population.

A. Chemical properties and uses

12. PFAS are synthetic organofluorine compounds, all with carbon atoms that are fully fluorinated. PFAS are a chemical class with diverse molecular structures and these variations may result in particular PFAS having different impacts on ecosystems, humans and wildlife.[7] Long-chain PFAS are compounds containing seven or more perfluorinated carbon atoms in their backbones and are generally more bioaccumulative than shorter-chained PFAS. [8] Certain long-chain PFAS have been found to be particularly hazardous to human health and the environment, namely perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS) and long-chain (C9-C21) perfluorocarboxylic acids (PFCAs). Short-chain PFAS and ultrashort-chain PFAS are more mobile, less bioaccumulative, but also extremely persistent and subject to long-range transport.

13. Emerging evidence indicates that short-chain PFAS may be as harmful as long-chain PFAS, with similar toxicological profiles.[9] For example, Germany has provided evidence to the European Chemicals Agency on the reproductive toxicity of trifluoroacetic acid (TFA), an ultrashort-chain PFAS, and the Agency's scientific committee has concluded that

[4] All submissions mentioned in the present report are available from https://www.ohchr.org/en/calls-for-input/2026/call-input-forever-chemicals-pfas-human-rights.

[5] See https://doi.org/10.1787/35b035df-en.

[6] OECD, *Report on Per- and Polyfluoroalkyl Substances and Alternatives in Coatings, Paints and Varnishes (CPVs): Hazard Profile*, Series on Risk Management, No. 80 (Paris, 2024). See also https://www.sciencedirect.com/science/article/pii/S0160412025003800.

[7] See https://pmc.ncbi.nlm.nih.gov/articles/PMC8915888/.

[8] OECD, *Report on Per- and Polyfluoroalkyl Substances and Alternatives in Coatings, Paints and Varnishes*. See also https://www.sciencedirect.com/science/article/pii/S0160412025003800.

[9] Submission from Arnika.

trifluoroacetic acid may damage the unborn child and impair fertility and should be classified as reprotoxic.[10]

14. Numerous industrial processes use PFAS and myriad consumer products contain PFAS. Common uses of PFAS include personal care and cleaning products, non-stick cookware, textiles, lubricants, firefighting foam and food packaging.[11] PFAS are also found in pesticides and fracking chemicals. Fluoropolymers specifically are used in semiconductors, solar panels and medical devices.[12]

B. Occupational exposure

15. Workers in facilities that manufacture PFAS are often exposed to the chemicals and often exhibit the highest levels of PFAS in their blood.[13] Workers in sectors that utilize PFAS, including waste management, sanitation and wastewater, agriculture, construction, textiles, healthcare, fluorochemical production and firefighting, are also exposed to the chemicals.[14]

C. Exposure pathways

16. Exposure to PFAS in the environment can occur through multiple pathways, including by drinking contaminated water, breathing contaminated air, skin contact, hand-to-mouth contact and consumption of contaminated food.[15] PFAS exposure can also occur in utero when PFAS move from mother to child through the placenta.

17. Food and drinking water contaminated with PFAS are the most significant direct, external exposure pathways, other than occupational exposure.[16] Water is polluted by discharges from chemical facilities that manufacture PFAS, wastewater treatment plants, firefighting activities using PFAS foams, textile industry wastewater and solid waste dumps and landfills, among others.[17] PFAS are also found in sewage sludge being used as fertilizer. Leachate from municipal solid waste contains PFAS that leach from products such as plastics, electronics, non-stick cookware, cosmetics and cleaning agents.[18] Many municipal landfills were constructed without adequate leachate control systems, which results in PFAS-contaminated waters infiltrating local waters.[19]

18. People are also exposed to PFAS through consumer product use. Clothing treated by water-repellent finishes or flame retardants expose their wearers and leach PFAS when washed.[20] PFAS are applied to food packaging, including microwavable popcorn, parchment paper and pizza boxes, that then leach into food.[21] Fish caught in PFAS-contaminated watercourses expose individuals who eat them to PFAS.[22]

[10] See https://echa.europa.eu/documents/d/guest/rac77_final_minutes_en. See also https://www.scaht.org/en/news/news-container/echa-scientific-committee-supports-classification-of-tfa-as-toxic-to-reproduction/.
[11] Submission from International Pollutants Elimination Network (IPEN).
[12] European Environment Agency, “PFAS polymers in focus – supporting Europe’s zero pollution, low-carbon and circular economy ambitions” (Publications Office of the European Union, 2025).
[13] See https://pubmed.ncbi.nlm.nih.gov/36977833/.
[14] Submission from Public Services International; and online consultation on PFAS between the Special Rapporteur and labour unions, February 2026.
[15] See https://pubmed.ncbi.nlm.nih.gov/33201517/.
[16] Submission from Beyond Pesticides.
[17] Submission from Nexus3 Foundation.
[18] See https://www.sciencedirect.com/science/article/abs/pii/S2468584422000939?via%3Dihub.
[19] See https://pubmed.ncbi.nlm.nih.gov/30784829/.
[20] See https://pubmed.ncbi.nlm.nih.gov/35588958/.
[21] See https://pubmed.ncbi.nlm.nih.gov/36573587/.
[22] Submission from IPEN.

19. Industrial discharges and waste-management processes occurring near communities result in damaging health impacts through secondary exposure to gases, aerosols, dust, leachates or other waste.[23] The incineration of waste containing PFAS often presents a similar health and environmental burden to those living near the incinerators, especially because incineration does not always fully destroy PFAS.[24]

D. Adverse impacts

20. PFAS have endocrine disrupting properties that significantly impact fetal growth and development.[25] PFAS bioaccumulation generally increases with longer carbon chains, such as perfluorooctanoic acid and perfluorooctane sulfonic acid, and causes adverse health effects at very low concentrations. Some of the most well-documented include immunotoxicity, increased risk of kidney and testicular cancers, liver damage, increased cholesterol levels, hormonal interference, metabolic disruption, dyslipidemia, developmental harms to children, reproductive and fertility-related effects, reduced vaccine responsiveness and thyroid disease.[26]

21. The evidence on the adverse health impacts of long-chained PFAS raises concerns about the potential health impacts of other PFAS, given their similar chemical structures. For example, the ultrashort-chained trifluoroacetic acid was considered innocuous, but additional research has revealed potential reproductive and liver toxicity.[27] Similarly, GenX, a PFAS used as an alternative to perfluorooctanoic acid, is extremely mobile in the environment and remains in water bodies, hence threatening drinking water safety.[28] Epidemiological and experimental data have indicated potential toxic effects of GenX on the liver, reproductive and endocrine systems, kidneys and other organ systems.[29]

III. Environmental justice and per- and polyfluoroalkyl substances

22. PFAS are not only a diffuse planetary pollutant; they form part of a recurring pattern in which people living in poverty, racial and ethnic minorities, Indigenous Peoples and other groups in vulnerable situations are often systematically placed closer to PFAS sources, provided with less or no information and left to shoulder a disproportionate share of the health and psychosocial burdens.[30] This raises environmental justice concerns at the global and local levels and ethical concerns regarding PFAS production and release that engage international human rights standards.

A. Global environmental justice

23. While PFAS were created, produced and released in industrialized countries, they burden people, waters and soils far beyond the global North. Local communities in developing countries are often on the receiving end of PFAS-contaminated leachate from dumps and landfills, application of PFAS pesticides and burning of PFAS waste plastics and textiles imported from industrialized countries.

24. Exports of PFAS chemicals and technologies from industrialized countries to developing countries are causing growing pollution. For example, while Bangladesh does not

[23] Submissions from Public Services International and Waterkeeper Alliance.
[24] Submission from Zero Waste Europe.
[25] See https://www.endocrine.org/topics/edc/what-edcs-are/common-edcs/pfas.
[26] See https://www.hbm4eu.eu/wp-content/uploads/2022/05/Policy-Brief-PFAS.pdf. See also https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas.
[27] Submission from Royal Society of Chemistry.
[28] See https://echa.europa.eu/fr/-/msc-unanimously-agrees-that-hfpo-da-is-a-substance-of-very-high-concern.
[29] See https://pmc.ncbi.nlm.nih.gov/articles/PMC12012656/.
[30] Submission from ClientEarth.

produce PFAS, textile products exported from Bangladesh contain amounts of PFAS which exceed European Union regulatory limits.[31] Similarly, products containing PFAS are routinely exported to the developing world without transparency or labelling. For example, microwave popcorn products containing toxic PFAS are made in the United States of America and exported to Indonesia.[32] Also, dirty PFAS-producing technologies are being exported to developing countries. For example, the Miteni PFAS facility, responsible for extensive PFAS contamination of groundwater and drinking water in the Veneto region of Italy, was dismantled, shipped to the state of Maharashtra, India, and reassembled for continued PFAS production.[33]

25. The North-South transfers of PFAS plastics and plastic waste have been framed as waste colonialism.[34] PFAS are routinely added to plastics, including plastic packaging, synthetic textiles and compostable plastics. Many low-value plastics shipped to Africa, Asia and elsewhere contain PFAS, and they quickly become PFAS waste. Despite controls on plastic waste trade having been strengthened by the amendments to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, the transfer of plastic waste from industrialized to developing countries remains an underestimated and serious concern.[35] Reprocessing, informal recycling, burning and disposal of plastic waste release PFAS into air, soil and water. Informal waste pickers, women and children working at dumpsites often bear the brunt of PFAS exposure.

26. The export and application of PFAS-pesticides is another serious global environmental justice issue. Fluorination is used to increase the stability of pesticides and the residual activity of pesticide ingredients.[36] Because pesticide regulations are weaker in Africa and parts of Asia than elsewhere, these markets end up receiving phased-out PFAS-pesticides.[37] PFAS-pesticides involve wide-ranging implications for agriculture, food and water contamination within and across regions and borders. For example, studies from Europe show that the number of fruits and vegetables with detectable PFAS-pesticide residues in Europe nearly tripled between 2011 and 2021.[38]

B. Sacrifice zones

27. PFAS contamination follows existing geographies of marginalization and power, creating new sacrifice zones and intensifying the vulnerability of those already at risk. Communities already vulnerable due to poverty, racial discrimination or marginalization are more likely to live near industrial facilities, airports, military installations or waste sites that release PFAS, and more likely to rely on underresourced water systems that cannot detect or effectively remove PFAS.[39] Similar disparities emerge where PFAS-contaminated pesticides are applied near public water supplies of rural communities or Indigenous Peoples.[40]

28. The invisibility, persistence and chemical complexity of PFAS allow industries and regulators to keep the threat unpublicized while exposure quietly accumulates in particular territories and bodies.[41] Analysis of PFAS-contaminated sites shows that affected communities often learn of contamination years or decades after exposure, and that their lived

[31] Submission from Environment and Social Development Organization (ESDO).
[32] See https://ipen.org/documents/toxic-hazards-microwave-popcorn.
[33] Submission from Gianluca Liva.
[34] Submission from Plastic Pollution Coalition.
[35] See A/76/207. See also UNEP/CHW/OEWG.15/INF/32.
[36] Submission from Beyond Pesticides.
[37] Submission from Community Action Against Plastic Waste (CAPws).
[38] Submission from ClientEarth.
[39] See https://hsph.harvard.edu/news/communities-of-color-disproportionately-exposed-to-pfas-pollution-in-drinking-water.
[40] See https://publichealth.berkeley.edu/articles/spotlight/research/study-highlights-racial-and-ethnic-disparities-in-pfas-threat.
[41] See https://www.sciencedirect.com/science/article/pii/S1462901125002977.

experiences of illness, loss of livelihood and cultural disruption are frequently dismissed or minimized until independent monitoring, investigative journalism or litigation confirms what residents have long suspected.[42]

29. The resulting PFAS sacrifice zones are not accidental, but arise in places where communities often have the least political and economic power to resist polluting activities, and where regulatory systems are often least responsive to their complaints and least willing to challenge powerful corporate actors.[43] Corporate actors often know about the potential harms but fail to disclose them and instead, mislead the public and regulators through disinformation on the risks of PFAS.[44] As early as the 1950s, manufacturers conducted studies demonstrating that PFAS could pose health risks. Yet, these manufacturers failed to disclose these studies to the public, regulators and workers.[45]

30. Vulnerability in PFAS-affected communities is multidimensional. Residents are more likely to face barriers to healthcare access and have limited capacity to pay for alternative water sources, in-home treatment systems or medical testing when contamination is revealed.[46] PFAS exposure in such communities is associated not only with elevated physical health risks but also with mental health impacts from feelings of powerlessness, unsafeness and loss of trust in governmental institutions. In certain cases, it has also led to financial damage, such as in the case of farmers operating on contaminated land who cannot sell their produce.[47] Even when litigation is successful, the amount of compensation rarely covers the actual harm and does not allow affected people to move away from the polluted zones.[48]

C. Ethics of the production and release of per- and polyfluoroalkyl substances

31. With PFAS being synthetic chemicals without analogues in the natural world, PFAS production and release present ethical issues relevant to the international human rights obligations of Governments to prevent toxic exposures and irreversible harm to the functioning and integrity of ecosystems.

32. Ethical considerations also stem from the mobility and persistence of PFAS.[49] Mobility involves wide dispersion and potential adverse impacts on people and ecosystems far from the point of release. Persistence involves timescales of decades and centuries, raising issues of uncertainty, environmental restoration and the rights of future generations, among others. Also, persistence relates to unforeseen and unbounded consequences for the functioning of ecosystems, illustrated by other persistent chemicals that, decades after their release, were discovered to pose serious threats to human health (polychlorinated biphenyls) or the ozone layer (chlorofluorocarbons).

33. Chemical corporations argue that only a few PFAS have been found to be hazardous, while other PFAS are beneficial for human societies.[50] This raises the question of whether PFAS should be regulated as a class. To date, Governments have generally taken a chemical-by-chemical approach to regulation, based on risk assessments. Because the information needed to make such assessments is often limited or unavailable, as is the case

[42] Submission from Dutch Water Authorities and others.
[43] See A/HRC/49/53.
[44] See https://pmc.ncbi.nlm.nih.gov/articles/PMC10237242/. See also https://foreverpollution.eu/lobbying/the-disinformation-campaign/.
[45] See https://www.ewg.org/news-insights/news/decades-polluters-knew-pfas-chemicals-were-dangerous-hid-risks-public.
[46] See https://pmc.ncbi.nlm.nih.gov/articles/PMC12295872/.
[47] Submission from Stichting Gezondheid op 1 (Health First Foundation).
[48] See https://www.genre.com/us/knowledge/publications/2025/march/pfas-regulation-and-development-at-the-european-level-en.
[49] Anne Chapman, *Democratizing Technology: Risk, Responsibility and the Regulation of Chemicals* (Routledge, 2012).
[50] Submissions from American Chemistry Council, American Chemistry Council's Performance Fluoropolymer Partnership and the Chemours company.

for synthetic chemicals such as PFAS, this approach has enabled the release into the environment of countless hazardous chemicals. The result is the increasing toxification of the planet and impairment of fundamental human rights.

34. Policies that favour PFAS technologies above alternative non-PFAS innovations and other societal considerations benefit the economic interests of some corporate actors, to the detriment of society and the people who carry the burdens of pollution. Twelve producers are responsible for most PFAS production, netting global profits estimated at $4 billion, while in Europe alone, healthcare costs are estimated at €52–84 billion annually, with €238 billion in water purification, plus the costs of remediating the 17,000 sites contaminated with PFAS.[51]

35. The externalization of burdens that result from governmental failures to take adequate preventive action raises ethical considerations of agency and justice, especially where those who disproportionately suffer the adverse impacts, including future generations, have no role in decision-making.[52] PFAS externalities also underscore the sheer socioeconomic costs of inaction, namely, the costs that society will have to pay in the future if action is not taken to limit emissions of PFAS today.[53]

36. Well-established environmental law principles are particularly relevant for human rights protections in this area. The externalization of harm immediately evokes the polluter-pays principle.[54] The knowledge of corporate actors about the risks of certain PFAS, coupled with their silence or disinformation tactics, implicates the right to science and the principle of prevention of environmental harm.[55] The toxic evidence available for many PFAS, and the extreme persistence of all PFAS, engages application of the principles of prevention and the precautionary principle to adequately control the whole PFAS class. These principles underline the critical importance of accountability in the face of the organized irresponsibility apparent in decisions over PFAS.[56]

IV. Human rights and per- and polyfluoroalkyl substances

37. Human rights standards, including extraterritorial obligations, play a key role in confronting global PFAS contamination and widespread exposure. Adverse health impacts, including terminal illnesses, affect the rights to life and health. The persistence of PFAS and the toxicity of many PFAS undermine the right to a clean, healthy and sustainable environment. The obstacles posed to the accountability of polluters often undermine the right of access to justice and effective remedies.

A. Rights to life, health and a healthy environment

38. Exposure to PFAS may compromise the rights to life and health, given the broad range of adverse outcomes associated with such exposure. Public health bodies recommend that clinicians consider PFAS exposure as a relevant factor for a range of chronic conditions and highlight that many PFAS are highly persistent and bioaccumulate, remaining in the human body for years and turning repeated low-level exposures into substantial lifetime body burdens. Studies also describe how PFAS exposure can affect cholesterol levels, liver enzymes and immune function, underscoring that these chemicals interfere with multiple

[51] See https://chemsec.org/reports/the-top-12-pfas-producers-in-the-world-and-the-staggering-societal-costs-of-pfas-pollution/.

[52] Submissions from Alaska Community Action on Toxics and the Dominican Republic.

[53] Submission from Child Rights International Network (CRIN).

[54] OECD, Guiding Principles concerning International Economic Aspects of Environmental Policies (1972).

[55] Submission from Lieselot Bisschop, Erasmus School of Law.

[56] Hans Jonas, *The Imperative of Responsibility: In Search of an Ethics for the Technological Age* (University of Chicago Press, 1984).

physiological systems.[57] PFAS-contaminated communities experience heightened mental health impacts, including anxiety, depression, impaired cognitive functioning and a pervasive sense of uncertainty about their own health and that of their children.[58]

39. Exposure to PFAS is also deeply unequal, exacerbating pre-existing inequalities. The use of PFAS in menstrual products undermines the right to health of women, girls and other people who menstruate. Similarly, the use of PFAS in cosmetics disproportionately impacts women's right to health.[59] Exposure to perfluorooctanoic acid and perfluorooctane sulfonic acid has been associated with an increased risk of cardiovascular disease in postmenopausal women.[60]

40. Long-term PFAS contamination has also disproportionately impacted Indigenous Peoples. For example, high levels of PFAS contamination of the traditional foods of Indigenous communities are seen throughout the Arctic region.[61]

41. Scientific studies also highlight that the high persistence of chemicals, including PFAS, has a built-in potential to cause harm.[62] Persistence makes exposure longer, higher and more widespread, transforming modest toxic potency into large-scale, long-term harm. As a result, the extreme persistence of PFAS undermines the right to a clean, healthy and sustainable environment.

B. Right to a safe and healthy working environment

42. The human rights implications of PFAS are one of the priority global chemical-exposure concerns for workers, who are the first and often most intensely exposed. In 2022, the International Labour Organization (ILO) amended the ILO Declaration on Fundamental Principles and Rights at Work and its Follow-up of 1998 to recognize "a safe and healthy working environment" as a fundamental principle and right at work for all workers, alongside freedom of association, the elimination of forced labour, child labour and discrimination. ILO member States, irrespective of ratification of specific conventions, thus have a duty to respect, promote and realize this right, including in relation to hazardous chemicals such as PFAS. Trade unions, professional bodies and occupational safety organizations have framed this as a paradigm shift: occupational safety and health can no longer be treated as a technical add-on; it is integral to human rights.[63]

43. Analyses across sectors indicate that workers in chemical manufacturing, metal plating, textiles and leather, firefighting, aviation, waste management and other industries frequently show higher concentrations of PFAS than surrounding communities.[64] Public health bodies report that firefighters using aqueous foams and chemical manufacturing workers often have PFAS levels many times higher than those of the general population and that workplace exposure has been linked to increased risks of cancer, immune effects, liver toxicity and reproductive harm.

44. Yet, significant gaps remain in the governance of PFAS at work. Occupational exposure data are limited to a small number of industries and countries. Millions of workers may be exposed to complex mixtures of PFAS and other hazardous substances without adequate monitoring, labelling, training or control measures, and with limited awareness of the long-term health implications. Such conditions are difficult to reconcile with States' obligations under ILO instruments such as the Occupational Safety and Health Convention, 1981 (No. 155), the Chemicals Convention, 1990 (No. 170), and the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187). These instruments require

[57] Submission from Public Services International.
[58] See https://pubmed.ncbi.nlm.nih.gov/40724183/.
[59] Submission from Weaving Voices for Health & Justice.
[60] Submission from Türkiye.
[61] See https://www.sciencedirect.com/science/article/pii/S0048969724064301.
[62] See https://pubs.acs.org/doi/10.1021/acs.est.6c00770.
[63] Submission from Public Services International.
[64] Submission from Greenpeace Thailand.

hazard identification and assessment, application of the hierarchy of controls, provision of information and training, and systems for worker participation and withdrawal from dangerous situations.[65]

45. From a workers' rights perspective, PFAS exposure reveals a structural failure to protect workers from preventable toxic exposures. Workers in PFAS-intensive sectors have generated much of the early scientific evidence on PFAS bioaccumulation and toxicity through their own elevated body burdens, yet they have often been among the last to be informed of the risks or to receive effective protective measures or compensation.[66] While some jurisdictions have provisions to compensate specific types of workers, such as firefighters who developed cancer as a result of aqueous film-forming foam exposure,[67] most jurisdictions do not. Recognizing PFAS as a human rights issue in the workplace requires that workers be fully informed, able to participate in decisions about PFAS use and substitution and entitled to effective remedies when their right to a safe and healthy working environment is violated.

C. Rights of access to justice and effective remedies

46. Lack of accountability in the context of PFAS aggravates the increasing toxification of the planet and the resulting infringements of human rights such as the rights to life, health and a clean, healthy and sustainable environment.[68]

47. The experience of PFAS-affected communities shows that, even where scientific evidence of harm is mounting, pathways to justice remain narrow, costly and highly unequal.[69] Victims face structural barriers to justice that include the difficulty of proving causation, statutes of limitation, information asymmetries where companies and sometimes State agencies control toxicological and exposure data, and the high costs of environmental sampling, biomonitoring and expert testimony.[70]

48. Many impacted communities lack health data because there is no routine testing of water or blood for PFAS and no occupational or community registries capable of documenting disease patterns over time. This makes it difficult for victims to demonstrate the scale of harm or to link specific outcomes to particular sources. In some jurisdictions, statutes of limitation begin to run long before contamination is discovered or diseases emerge, effectively extinguishing claims before they can be brought. These barriers mean that the formal availability of courts does not always translate into meaningful access to justice and remedies for PFAS-exposed individuals and populations. Without measures to improve communities' access to justice, PFAS will deepen the gap between the formal recognition of access to justice as a right and the lived reality of communities and workers seeking redress for toxic harm.

V. Global and regional responses

49. The international regulatory landscape on PFAS remains markedly fragmented and limited in its coverage. In 2009, the Strategic Approach to International Chemicals Management (SAICM), which was established by the first International Conference on Chemicals Management in 2006, addressed PFAS as an "emerging policy issue". In 2023, the Global Framework on Chemicals – For a Planet Free of Harm from Chemicals and Waste succeeded the Strategic Approach and its International Conference will decide upon PFAS as an "issue of concern" at its next session.[71]

[65] See https://iosh.com/about/what-we-do/osh-fundamental-right.
[66] See https://pmc.ncbi.nlm.nih.gov/articles/PMC10533727/.
[67] Louisiana, United States of America, Development of cancer during employment in fire service; occupational disease, Law No. RS 33:2011 (2025).
[68] See A/HRC/60/34.
[69] Submission from Clean Cape Fear.
[70] Submission from Lieselot Bisschop, Erasmus School of Law.
[71] SAICM resolution V/5.

50. Under the Strategic Approach to International Chemicals Management, a programme on managing perfluorinated chemicals and the transition to safer alternatives was initiated, focusing on improving global knowledge about PFAS production, uses, emissions and impacts, and facilitating information exchange on alternatives and regulatory approaches.[72] While some responses to the threats posed by PFAS predate the Strategic Approach, this cumulative body of work has been instrumental in informing responses at the global, regional and national levels.

A. Global responses

51. Multilateral environmental agreements such as the Basel Convention, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, and the Stockholm Convention on Persistent Organic Pollutants have targeted specific PFAS. The absence of strong domestic legal frameworks in many developing countries means that multilateral environmental agreements are the only mechanisms for regulation.[73] However, the ability of such agreements to address PFAS is limited because they control only some of the thousands of PFAS in the class.

1. Montreal Protocol on Substances that Deplete the Ozone Layer

52. The Montreal Protocol on Substances that Deplete the Ozone Layer of 1987 does not directly regulate PFAS, as PFAS are not known ozone-depleting substances, but is relevant to PFAS in two ways: the potential control of substitute chemicals for ozone-depleting substances and the concept of "essential uses".[74]

53. The phase-out of ozone-depleting substances under the Montreal Protocol is driving the transition to substitute chemicals, such as fluorine-free refrigerants and hydrofluoroolefins, for uses in refrigeration, air-conditioning and other industrial applications. Hydrofluoroolefins degrade in the atmosphere to form trifluoroacetic acid (TFA), an ultrashort-chained PFAS. Trifluoroacetic acid was believed to be innocuous, but recent evidence reveals reprotoxic potential (see para. 13 above).[75] Moreover, once released into the environment, trifluoroacetic acid is virtually impossible to remove. Therefore, the use of hydrofluoroolefins as substitutes for ozone-depleting substances could present a locking-in of technology resulting in PFAS contamination for decades, centuries or even longer.

54. The potentially adverse impacts of trifluoroacetic acid raise the question of whether the Montreal Protocol could be used to prevent their formation by controlling hydrofluoroolefins. There is precedent for the Montreal Protocol addressing environmental impacts associated with substitutes for ozone-depleting substances. In 2016, the Kigali Amendment to the Montreal Protocol introduced legally binding controls on hydrofluorocarbons, a group of substitutes for ozone-depleting substances with high global warming potential.[76]

55. The Montreal Protocol "essential use" framework is informing regulatory approaches to PFAS. This concept was introduced into the Montreal Protocol at its fourth Meeting of the Parties, held in Copenhagen in November 1992,[77] to allow flexibilities in respect of certain uses agreed to by the Parties after the deadline of the last compliance measure.[78] All ozone-depleting substances can be subject to essential use flexibilities, which meant that the Protocol forced technological change even where no alternative existed for a specific

[72] SAICM resolution II/5.
[73] Submission from Secretariat of the Basel, Rotterdam and Stockholm Conventions.
[74] See https://ozone.unep.org/system/files/documents/TEAP-May2025-Progress-Report-vol1.pdf.
[75] See https://pubs.acs.org/doi/10.1021/acs.est.4c06189.
[76] See https://ozone.unep.org/treaties/montreal-protocol/amendments/kigali-amendment-2016-amendment-montreal-protocol-agreed.
[77] Decision IV/25.
[78] See arts. 2G and 2I.

application, given the serious threats posed by those substances to the ozone layer. While the essential use flexibilities allow for continuing use of ozone-depleting substances, they focus the regulatory question on strict necessity.

56. At that meeting, the Parties to the Montreal Protocol established criteria for exemptions for "essential use" of ozone-depleting substances. Under these criteria, the use of a controlled substance is essential only if it is necessary for the health or safety or critical for the functioning of society, and there are no available technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of environment and health.[79]

2. Basel Convention

57. The objective of the Basel Convention of 1989 is to protect human health and the environment from the transboundary movements and unsound management of hazardous wastes. Three of its dimensions are particularly relevant to PFAS, namely its control mechanism, guidance on environmentally sound management of PFAS wastes, and bilateral or regional arrangements.

58. Wastes containing or contaminated with perfluorooctane sulfonic acid, perfluorooctanoic acid and other persistent organic pollutants listed in the Stockholm Convention are subject to controls pursuant to the Basel Convention.[80] There are two chief mechanisms of control. First, the Convention was amended to ban the export of hazardous wastes from States members of OECD and States members of the European Union and Lichtenstein to other countries. This amendment binds the 104 Parties that have accepted it.[81] Second, where the ban amendment does not apply, the Convention subjects the transboundary movements of hazardous wastes to its prior informed consent procedure.[82] The limited coverage of the Convention means that significant amounts of PFAS wastes that do not contain listed persistent organic pollutants may not be controlled by this instrument. This limited scope also attaches to the technical guidelines on the environmentally sound management of wastes containing listed PFAS-persistent organic pollutants adopted at the Conference of the Parties to the Basel Convention at its 16th meeting, held in Geneva in 2023.[83]

59. Article 11 of the Basel Convention allows for transboundary movements of hazardous wastes to take place under another agreement that provides for an equivalent level of protection. The OECD Decision of the Council on the Control of Transboundary Movements of Wastes Destined for Recovery Operations[84] has been relied upon by States for such movements. For example, in 2014, the Netherlands, a Party to the Basel Convention, allowed the Chemours company to start transferring PFAS wastes to the United States of America, which is not a Party to the Basel Convention.[85] However, reportedly more than half of those PFAS wastes were not recovered but were disposed of.[86] This situation raises the question of whether this OECD instrument is enabling transboundary movements of hazardous wastes that are not recovered but are disposed of, in potential breach of that instrument.

3. Rotterdam Convention

60. The Rotterdam Convention of 1998 promotes shared responsibilities and cooperative efforts among Parties. In 2013, the Parties amended annex III to include perfluorooctane sulfonic acid and its salts. In 2021, they further amended that annex to list perfluorooctanoic

[79] Decision IV/25.
[80] Submission from Secretariat of the Basel, Rotterdam and Stockholm Conventions.
[81] See E/CN.4/2001/55 and A/HRC/24/39.
[82] Basel Convention, art. 6.
[83] UNEP/CHW.16/6/Add.2/Rev.1.
[84] See https://legalinstruments.oecd.org/public/doc/221/221.en.pdf.
[85] See NLD 2/2023; USA 26/2023 and response from Chemours. All allegation letters mentioned in the present report are available from https://spcommreports.ohchr.org/Tmsearch/TMDocuments.
[86] See https://news.bloomberglaw.com/environment-and-energy/chemours-pfas-waste-imports-scrutinized-despite-epas-approval.

acid and its salts and perfluorooctanoic acid-related compounds.[87] As a result, perfluorooctane sulfonic acid, perfluorooctanoic acid and their related compounds are now subject to the prior informed consent procedure of the Convention. The listing of chemicals in annex III requires consensus by the Conference of the Parties. This has posed an obstacle to the coverage by the Convention of chemicals recommended for listing by the Chemical Review Committee. This situation signals a breakdown of the Convention's science-policy interface mechanism and diminishes the prospects of its efficacy for the control of other PFAS.

4. Stockholm Convention

61. The Stockholm Convention of 2001 restricts the production, use, import and export of certain PFAS molecules. The criteria used in the Convention for listing persistent organic pollutants include whether the chemical is likely, as a result of long-range environmental transport, to lead to significant adverse human health or environmental effects. Scientific assessments under this Convention and related global work confirm that certain PFAS are highly persistent, bioaccumulative and widely distributed.

62. Annexes A and B to the Convention are particularly relevant for PFAS, as they list persistent organic pollutants subject to controls on intentional production and use. Listed in annex A for elimination are: (a) perfluorooctanoic acid, its salts and perfluorooctanoic acid-related compounds; (b) perfluorohexane sulfonic acid (PFHxS), its salts and perfluorohexane sulfonic acid-related compounds; and (c) long-chain perfluorocarboxylic acids, their salts and related compounds. Listed in annex B for restrictions on production and use are perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride.

63. The Convention allows narrowly defined, time-bound exemptions where alternatives to listed persistent organic pollutants do not exist or are not readily available. The register of exemptions in the Convention includes exemptions for certain PFAS.[88] For example, Parties have registered specific exemptions for perfluorooctanoic acid, its salts and perfluorooctanoic acid-related compounds for several uses, including fire-fighting foam and invasive and implantable medical devices. Similarly, long-chain perfluorocarboxylic acids are exempted for certain semiconductors and replacement parts for motor vehicles that have ceased mass production.[89] Several exemptions have already expired and others have been removed.[90]

64. The Convention sets the conditions under which the import and export of chemicals listed in annexes A and B are permissible, namely for the purpose of environmentally sound disposal or for a use or purpose which is permitted for the concerned Party under annex A or annex B. The Convention also controls the export of the listed PFAS to a State that is not Party to the Convention.

65. Experience under the Stockholm Convention has demonstrated that inadequate waste treatment or destruction technologies may result in unintentional releases of persistent organic pollutants, including during thermal processes. Dealing with PFAS wastes in an environmentally sound manner, including transboundary movements, is thus critical to avoiding exposure risks. Nevertheless, PFAS remain embedded in many products that traverse borders without specific controls, and PFAS-containing wastes (e.g., spent firefighting foams and textiles) enter global recycling and waste streams. Strengthening information systems on the presence of PFAS in products and wastes, clarifying waste classifications, and updating technical guidelines for PFAS destruction can enhance the ability of Parties to prevent transboundary harms and uphold human rights.

[87] Submission from Secretariat of the Basel, Rotterdam and Stockholm Conventions.
[88] See register of specific exemptions.
[89] SC-12/12.
[90] SC-4/17 and SC-9/4.

B. Regional responses

66. Certain regional instruments govern the transboundary movements of hazardous wastes among their Parties. These instruments relate to article 11 of the Basel Convention.

67. The Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa of 1991 establishes a regional framework for African States to regulate the transboundary movement and management of wastes, hazardous wastes and radioactive wastes.[91] Unlike the reliance of the Basel Convention on a prior informed consent mechanism, the Bamako Convention bans the import into Africa of hazardous wastes covered by the agreement.[92] The question of whether waste containing PFAS is covered under the Bamako Convention hinges on how the Convention defines hazardous wastes. The Bamako Convention defines waste according to national legislation and also considers that waste is hazardous if it meets any of the characteristics listed under annex II, including if it is toxic, ecotoxic or can result in leachate.[93] While PFAS can satisfy these criteria, the lack of specific mention of PFAS in this Convention may lead to uneven implementation, as different Parties may hold divergent views or standards for what is toxic, ecotoxic or what can result in leachate.[94]

68. The Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region (Waigani Convention) of 1995 is a regional treaty banning the import of hazardous and radioactive waste into Pacific Islands Forum nations. Under the Convention, hazardous waste is defined as waste which is toxic (delayed or chronic), ecotoxic or considered to be hazardous by the national legislation of the exporting, importing or transit Party.[95] Annex I outlines specific categories of hazardous waste, including wastes from the production, formulation, treatment or use of organic solvents, inks, dyes, plastics, glue and pharmaceutical products. PFAS waste streams, industrial effluents, firefighting foams, contaminated products and disposal residues constitute hazardous waste in many cases, despite PFAS not being specifically named in the Convention.[96]

69. The European Union, through its Regulation 2019/1021, directly transposes its obligations under the Stockholm Convention and thus classifies perfluorooctane sulfonic acid, perfluorooctanoic acid and perfluorohexane sulfonic acid as persistent organic pollutants (annex 1, part A). For these PFAS, it prohibits their manufacture, sale and use except for laboratory-scale research or as a reference standard or for the exemptions for which they have registered.[97]

70. The European Union Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation is also particularly relevant for PFAS.[98] In January 2023, Denmark, Germany, the Netherlands, Norway and Sweden submitted a proposal to the European Chemicals Agency for restriction on the manufacture, sale and use of PFAS as a class.[99] The class is defined in line with the OECD definition.[100] The submitters argued that this scope avoids regrettable substitution of one PFAS by another PFAS and also allows the relevant entities to tackle the problem of ongoing, uncontrollable emissions at the source instead of an unachievable end-of-pipe solution.[101]

71. In March 2026, the European Chemicals Agency reported that its two scientific committees support European Union-wide restrictions on PFAS as a class, subject to specific

[91] Bamako Convention, arts. 1 (1) and (2) and art. 2 (2).
[92] Ibid., art. 4.
[93] Ibid., annex II.
[94] Ibid., art. 2.
[95] Waigani Convention, art. 2 (1) and annex II.
[96] Ibid., art. 4 (1) (a) and (3).
[97] Regulation (EU) 2019/1021, arts. 3 and 4 and annex 1, part A.
[98] Regulation (EC) No. 1907/2006, art. 1 (1).
[99] See ECHA/NR/23/04.
[100] OECD, *Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances*.
[101] See https://echa.europa.eu/documents/10162/f605d4b5-7c17-7414-8823-b49b9fd43aea.

derogations and controls, to address the growing and long-lasting risks PFAS pose to people and the environment.[102] Once the Agency concludes its consultations and scientific studies, the European Commission is expected, in 2027, to prepare a proposal for PFAS restrictions under the REACH Regulation and subject it to the European Union legislative process.

VI. Domestic responses

72. Internal laws and regulations are key tools for States to address the public health and environmental harms caused by PFAS. National and sub-national laws establish health, safety and environmental standards. They also enable civil, criminal and administrative accountability for polluters.

73. An examination of standards across jurisdictions reveals significant divergence, reflecting varying political pressures. These disparities reveal the important role of international standards based on the best available science in informing national regulations.[103] With regard to PFAS, however, other than the limited controls for certain PFAS molecules established in multilateral environmental agreements, international health, safety and environmental standards are lacking.

A. Regulatory approaches

74. Regulatory approaches to PFAS address drinking water contamination, hazardous wastes, product-specific regulations and legal standards for maximum levels of exposure, including defining what levels of PFAS contamination are considered toxic. While several States are establishing or updating legally enforceable limits for PFAS in drinking water, most States do not have domestic PFAS standards. Largely, these regulations do not address the sources of the PFAS contamination.

75. The following examples illustrate the regulatory divergence. The United States has set a maximum contaminant level of 4 nanograms per litre (ng/l) for perfluorooctanoic acid and perfluorooctane sulfonic acid in drinking water. This standard is relevant in the continental United States and also in United States military facilities overseas. In comparison, European Union drinking water legislation covers many more PFAS, but allows a range of concentrations depending on the type of PFAS (100–500 ng/l).[104] In Sweden, authorities have relied on a reference point for PFAS of 4 ng/l for drinking water safety. However, investigations at the Ronneby/Kallinge waterworks revealed PFAS concentrations as high as 10,380 ng/l, dramatically exceeding the reference point.[105] Japan established a provisional guideline of 50 ng/l in 2020 and transformed it into a permanent water quality standard in 2026.[106] This standard is more than 12 times higher than those set by the United States and Sweden.

76. The standards set by the United States and Japan also illustrate the position of local authorities. For example, in Okinawa, Japan, severe PFAS contamination has been detected in the areas surrounding the Futenma and Kadena airbases, operated by the United States.[107] Water sampling near the Kadena base revealed combined perfluorooctane sulfonic acid/perfluorooctanoic acid levels of 2,100 ng/l, which is 42 times higher than the standard set by Japan. Some of these waters feed into the drinking water supplies of Okinawa. With the support of the Government of Japan, the prefectural government of Okinawa has installed

[102] ECHA/NR/26/17, indicating that on 26 March 2026, the Risk Assessment Committee of the European Chemicals Agency had released its final opinion and the Agency's Socio-Economic Analysis Committee had released its draft opinion for consultation.

[103] Inter-American Court of Human Rights, *Inhabitants of La Oroya v. Peru*, judgment of 27 November 2023, para. 120.

[104] Directive (EU) 2020/2184.

[105] See SWE 2/2026; and submission from Save the Vättern Action Group.

[106] Submission from Japan.

[107] Submissions from Okinawa–Kyoto PFAS Research Group, Okinawa Prefectural Government, All Okinawa Council for Human Rights and Naomi Machida.

carbon filters to remove PFAS from drinking water at the Chatan Water Purification Plant.[108] The support of Japan, however, does not cover the replacement costs of the filters, and the United States has refused to provide support.

77. France has established a standard threshold of 100 ng/l for total PFAS in drinking water.[109] France has also adopted national legislation, Law No. 2025-188, which prohibits the use of PFAS in cosmetics, textiles and ski waxes.[110]

78. This regulatory divergence effectively creates different tiers of environmental injustice, where the fundamental right to safe water is afforded less protection for citizens in one State compared to another. Despite all members of the human family sharing the same biological nature, people receive different levels of health and environmental protection depending on where they live.

B. Litigation

79. When regulatory frameworks prove inadequate or are poorly enforced, litigation emerges as a critical mechanism for victims to seek remedy, establish corporate accountability and compel regulatory change, among other goals.

1. Civil litigation

80. In the United States, several civil cases focused on pursuing justice for victims of PFAS contamination, spanning decades. The first and landmark case was filed in 1999 by a farmer against chemical manufacturer DuPont in West Virginia. It revealed that DuPont, despite having knowledge of the toxicity of perfluorooctanoic acid, continued to release contaminated waters and wastes into the environment. A class action filed against DuPont resulted in an agreement establishing an independent science panel to look at the health impacts of perfluorooctanoic acid.[111] By 2013, the panel had confirmed sufficient scientific links between exposure to perfluorooctanoic acid and serious human diseases (kidney cancer, testicular cancer, thyroid disease, ulcerative colitis, preeclampsia and high cholesterol).[112] Through this class action litigation and later phases of the case involving multiple individual personal injury jury trials, DuPont ultimately paid over $850 million in compensation to the victims of the perfluorooctanoic acid contamination in that community for their personal injuries.[113]

81. In North Carolina, decades of contamination from the DuPont and Chemours Fayetteville Works facility have polluted the Cape Fear River, prompting lawsuits from multiple entities, including the State of North Carolina (seeking damages to the state's natural resources and other harm) and the Cape Fear Public Utility Authority (seeking to recover the immense costs of treating public drinking water supplies).[114] These legal challenges have also scrutinized corporate restructuring tactics, such as DuPont's creation of Chemours, which acquired DuPont's PFAS line. Plaintiffs allege this restructuring was designed to shield the parent company from its massive environmental liabilities.[115]

82. A separate but related legal front is Multi-District Litigation No. 2873 concerning aqueous film-forming foam in South Carolina. This mass tort litigation consolidates numerous claims against manufacturers of PFAS-containing firefighting foams. Key defendants, including 3M, Dupont, Tyco and BASF, have entered into class action

[108] See USA 6/2025.
[109] See FRA 4/2026.
[110] See décret n° 2025-1376.
[111] Submission from Sheeba Kapoor and Mahesh Rachamalla.
[112] Rob Bilott, *Exposure: Poisoned Water, Corporate Greed, and One Lawyer's Twenty-Year Battle against DuPont* (Atria, 2019).
[113] See https://www.taftlaw.com/services/case-studies/taft-is-a-global-leader-in-pfas-forever-chemicals-litigation-and-advisory-work/.
[114] See USA 26/2023.
[115] See A/HRC/60/34.

settlements for over $10 billion aimed at resolving claims for PFAS contamination in public water systems throughout the country.[116]

83. In Australia, litigation has primarily targeted the Government for PFAS contamination originating from military bases where aqueous film-forming foam was used. The cases have resulted in significant settlements for affected communities, compensating for property value loss and livelihood impacts. Examples include the 2020 $A 212 million settlement for communities in New South Wales, Queensland and the Northern Territory, and in 2023, a settlement of $A 132.7 million for 30,000 claimants across seven locations and a $A 22 million settlement with the Wreck Bay Aboriginal Community. However important, these settlements are limited in scope and explicitly do not cover personal injury claims, leaving a significant gap in remedy for individuals suffering from health impacts.[117] In 2026, the Government of Australia filed a $A 2 billion lawsuit against PFAS manufacturer 3M to recover the costs of investigating, managing and remediating contamination resulting from the 3M aqueous film-forming foam containing PFAS at 28 defence bases across Australia.[118]

84. In Sweden, a landmark case in Ronneby involved drinking water that was contaminated with PFAS from firefighting foam from a nearby Swedish Air Force Base, supplied to local communities by the municipal company Miljöteknik.[119] In 2023, the Swedish Supreme Court issued a precedent-setting decision that high levels of PFAS in the blood constitute a "personal injury" and that contaminated water is a "defective product" under the country's Product Liability Act. The court ruled that the "considerable physical deterioration that is manifested by the high PFAS blood levels" is itself a compensable physical defect under tort law, even in the absence of a diagnosed disease.[120] This ruling recognizes a more comprehensive legal definition of harm and could have significant implications for PFAS injury-based litigation globally.

2. Criminal prosecution

85. In 2025, the Court of Assizes in Vicenza, Italy, found 11 former executives of the PFAS producer Miteni guilty of environmental offences, including water poisoning and causing an environmental disaster.[121] The crimes concerned the company's discharge of PFAS into groundwater and the contamination of drinking water that served an estimated 350,000 residents across the provinces of Vicenza, Padua and Verona.[122] The executives were sentenced to combined prison terms of 141 years and substantial liability for environmental and public health damage.[123] The court awarded compensation of over €75 million to the Ministry of the Environment of Italy, the Veneto Regional government and to nearly 300 civil parties comprised of private individuals and public entities.[124]

86. The ruling represents an example of criminal accountability for PFAS-related pollution. However, the instrumentalities of the company including installations and patents that were used to commit the crime, instead of being seized and destroyed, were auctioned and then transferred to India.

[116] Bilott, *Exposure*.
[117] See A/HRC/57/52/Add.2.
[118] See https://www.minister.defence.gov.au/media-releases/2026-05-28/legal-proceedings-against-3m-company-3m-australia-pty-ltd.
[119] Submission from Johnny Sjöberg.
[120] See https://www.loc.gov/item/global-legal-monitor/2024-03-06/sweden-supreme-court-declares-high-levels-of-pfas-in-blood-constitutes-personal-injury.
[121] Submission from Claudia Marcolungo. See also Corte di Assise Di Vicenza, 26 June 2025, N. 1943/2016 R.G.N.R.
[122] See A/HRC/51/35/Add.2.
[123] See https://unipd-centrodirittiumani.it/en/news/pfas-contamination-case-in-veneto-vicenza-court-delivers-historic-judgement-in-pollution-trial.
[124] See https://www.taftlaw.com/news-events/law-bulletins/italian-court-sentences-11-over-crimes-related-to-pfas-contamination/.

3. Administrative litigation

87. Near Lyon, France, residents and workers in "Chemical Valley" allege to have suffered severe human rights violations linked to the industrial activities of Arkema France and Daikin Chemicals France. The PFAS contamination is widespread, affecting water, soil, air and food supplies.[125] In 2024, civil society groups requested the Administrative Court of Lyon to suspend prefectural authorizations allowing the companies to expand their plants but the Court declined. In 2026, residents filed a civil action in Lyon judicial court demanding compensation for the damages caused by these two PFAS producers.[126]

VII. Conclusions and recommendations

88. **PFAS underline the human rights obligations of Governments to prevent toxic exposures and irreversible harm to the functioning and integrity of ecosystems. These duties have global environmental justice dimensions, since PFAS are largely manufactured in industrialized States and then spread globally through emissions, transboundary movements of waste laden with PFAS, and international trade of products that contain PFAS.**

89. **Since PFAS lack analogues with the chemicals that compose the natural world, once released into the environment, PFAS disperse, travel and immerse themselves in existing matter, radically transforming the chemical composition of ecosystems. Owing to the strength of the carbon-fluorine bond, PFAS are highly persistent; thus, these transformations are irreversible for decades, centuries and millennia. While certain technologies exist to filter PFAS out of drinking water, removing them from ecosystems is impossible.**

90. **While much uncertainty derives from the interaction of novel, synthetic molecules with human bodies and ecosystems, over the past three decades science has revealed the dangers of PFAS and the harms they cause.[127] Industry documents demonstrate that companies knew PFAS were "highly toxic when inhaled and moderately toxic when ingested" since at least 1970.[128] Scientific evidence has continued to uncover risks and harms to human and environmental health, and many PFAS have been found to cause various forms of cancer and other adverse health effects. No PFAS have been conclusively determined to be safe.**

91. **Some regulatory instruments at the global and national levels have acted on available scientific evidence and banned or restricted the specific chemicals of the PFAS class that have been found to pose risks. Several times, this has led to the substitution of one PFAS for another PFAS in industrial production processes or the chemical composition of consumer products. As has been often the case with the chemical-by-chemical approach to regulation, once a chemical is substituted, science then begins to reveal the risks and harms associated with the substitutes.**

92. **Some argue that PFAS offer unparalleled convenience to society and can enhance standards of living, such as medical applications that can prolong life, or materials that enable information processing and transmission or that allow for faster or safer means of transport. Even where substances may be hazardous, the argument follows, they should be banned or restricted only if a specific PFAS is found to pose specific risks. For the wide class of PFAS, however, this approach results in continued release and exposure and mounting risks and harms.**

93. **Effectively tackling PFAS not only offers an opportunity to confront the growing toxification of the planet and the risks posed to human and environmental health, but**

[125] See FRA 4/2026.

[126] See https://notreaffaireatous.org/le-proces-des-200-contre-les-pfas-lancement-dun-des-plus-grands-proces-civils-deurope-contre-les-pfas-dans-la-vallee-de-la-chimie/.

[127] See https://pubs.acs.org/doi/full/10.1021/acs.estlett.4c00147.

[128] See https://pmc.ncbi.nlm.nih.gov/articles/PMC10237242/ and https://www.industrydocuments.ucsf.edu/docs/knpw0228/.

also to expand thinking about the conceptual bases for the sound management of chemicals and human rights protection. In this regard, the defining PFAS traits of extreme persistence, mobility, bioaccumulation and hazardousness, coupled with regrettable substitution practices, the irreversible changes PFAS cause and the uncertainty over the extent of their adverse impacts, call for PFAS to be treated as a class.

94. **Moreover, the availability of alternatives for most existing uses of PFAS offers a path that is consistent with human rights obligations. Where alternatives are not reasonably available, international instruments such as the Stockholm Convention and the Montreal Protocol supply examples of flexibilities to force technological innovation and change while enabling Parties to transition into the relevant control measures for the chemicals under their scope. These flexibilities often take the form of time-bound exemptions for specific uses that are critical for the functioning of society. While time-bound exemptions for essential uses can provide a tool for a managed transition into restrictions or phase outs, if such flexibilities are mismanaged or improperly abused, they can undermine the effectiveness of the regulatory instruments.**

95. **The class of PFAS illustrates the promises and perils of technological innovation, in many ways. Chemists have delivered novel, synthetic substances that have reconfigured the material fulcrum around which the world's economies revolve. At the same time, novel entities are exceeding the planetary boundary for chemical pollution, undermining the effective enjoyment of human rights at a planetary scale.**[129]

96. **The global threat to human rights and the environment posed by PFAS is a common concern of humankind. International human rights obligations and the customary duties to prevent environmental harm and to cooperate for environmental protection require urgent action at every level to avert the PFAS global threat.**

97. **The Special Rapporteur recommends that States:**

(a) **Immediately ban all non-essential uses of PFAS and adopt, without delay, comprehensive national laws, regulations, policies and plans to effectively control and phase out PFAS as a class of chemicals, regulating their production, placing in the market, use in products and industrial processes, emissions into the environment and presence in water, air, soils and food;**

(b) **Take immediate action to end human rights violations occurring in PFAS sacrifice zones by providing medical monitoring and treatment to the victims of PFAS exposure, phasing out PFAS manufacturing facilities, controlling PFAS pollution and remediating contaminated sites;**

(c) **Guarantee access to justice and effective remedies to individuals, workers and communities exposed to significant PFAS contamination, including compensation and environmental restoration, and ensure that interim measures of protection, such as injunctions, temporary suspensions and emergency relief, are available to them;**

(d) **Initiate negotiations toward an international legally binding instrument that advances a global phase-out strategy for PFAS. This new instrument should address PFAS as a comprehensive class of chemicals instead of focusing on individual substances and include time-bound flexibilities for PFAS uses that may be deemed essential for society where alternative technological substitutes are not currently available;**

(e) **Use all existing United Nations instruments to their full potential in addressing PFAS. This includes further strengthening and effectively implementing international instruments that already control PFAS, such as the Basel, Rotterdam and Stockholm Conventions, including in respect of wastes containing PFAS;**

(f) **Address PFAS as an issue of concern under the Global Framework on Chemicals – For a Planet Free of Harm from Chemicals;**

[129] See https://pubs.acs.org/doi/full/10.1021/acs.est.2c02765.

(g) **Take steps within the United Nations and its funds, programmes and specialized agencies, including the International Labour Organization and the World Health Organization, to take action to address PFAS-related issues concerning workers' rights, human health and other issues;**

(h) **Strengthen PFAS monitoring and data collection to accurately characterize PFAS contamination and exposure in their territories, including in surface water, groundwater and drinking water, soil, air and food chains, and through PFAS biomonitoring programmes for the population;**

(i) **Include PFAS in pollution information portals that provide environmental information to the public, including in environmental reports, emissions release and transfer registers and other tools;**

(j) **Ensure that information on PFAS contained in products is available to consumers through labelling and other means, and that information on PFAS used in industrial processes is available along supply chains;**

(k) **Enhance PFAS education and awareness-raising programmes;**

(l) **Support scientific and technological research that is free of conflicts of interest, including on the impacts of PFAS on human and environmental health, PFAS-alternative technologies and applications, and techniques for clean-up and remediation of environmental media contaminated with PFAS;**

(m) **Apply the polluter pays principle to ensure that business enterprises responsible for PFAS contamination cover the full costs of environmental remediation and provision of clean and safe water for drinking, hygiene and other uses;**

(n) **Design just transition strategies to support workers and communities that may be adversely affected by the phasing out of PFAS manufacturing facilities;**

(o) **Exclude PFAS-containing products from their public procurement.**

98. **The Special Rapporteur recommends that the Parties to the Bamako Convention and the Parties to the Waigani Convention strengthen these instruments to explicitly cover PFAS waste and develop guidance on its environmentally sound management.**

99. **The Special Rapporteur recommends that business enterprises, including financial institutions:**

(a) **Avoid financing projects that manufacture, utilize or distribute PFAS or PFAS-production technologies;**

(b) **Ensure workplaces that are safe from PFAS-related risks;**

(c) **Release complete results from any internal studies on PFAS;**

(d) **Establish take-back schemes for PFAS products, such as firefighting foam;**

(e) **Allocate resources to develop safe, non-PFAS alternatives.**

100. **The Special Rapporteur recommends that the intergovernmental negotiating committee to develop an international legally binding instrument on plastic pollution, including in the marine environment, include provisions in the proposed international legally binding instrument to effectively control and exclude PFAS from plastic products, except if the products are for essential uses and lack available alternatives.**

101. **The Special Rapporteur recommends that the open-ended intergovernmental working group on transnational corporations and other business enterprises with respect to human rights include provisions in the proposed internationally legally binding instrument that reflect the Special Rapporteur's guidelines on access to justice and effective remedies in the context of toxics, with particular emphasis on the burden of proof, statutes of limitations, collective actions and comprehensive remedies.**