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International Environmental Law: A Law of Side Effects?

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Abstract

A reader examining a contemporary account of international environmental law 20, 30 or 50 years from now may be interested not only in its accuracy but also in what the account conveys of our own generational perception of our past. By then, several features will have become evident to that reader, which our generation missed or under-estimated. One above all is likely to connect our and their perception of what international environmental law had to face: humanity, through its production and consumption processes, is changing not only human history but also the dynamics of the entire Earth System in what some see as a new geological epoch defined by humans, the 'Anthropocene'. This major fact is and will remain with us, and the extent to which it can be addressed depends on whether we see it and integrate it in our policies. This article argues that such is not the case of the social practice we call international environmental law, and this is, above all, for a very specific reason: international environmental law is built around an asymmetry between the legal organization of production and consumption processes – the 'transaction' – and the regulation of their side effects or 'negative externalities'. At the core of international environmental law lies a deliberate effort to preserve legal space for the transaction – the very processes that led us into the Anthropocene – while aiming to minimize its negative side effects for the global environment. It is an odd mismatch, akin to a legal requirement to keep the dam gates open while also requiring that the flooded areas be kept as dry as possible. International environmental law is faced with impacts affecting the geological timescale, but it is structured to preserve the cause of the problem and focus on side effects unfolding in a human timescale.

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1 Introduction

Historical accounts of how international law, as a discipline, a discourse and, above all, a practice, addressed the myriad phenomena gathered under the terms 'environment' or 'environmental' since the late 1960s have been organized mainly around several major conferences or summits,[1] starting with the Stockholm Conference on the Human Environment.[2] Any effort at periodizing a historical account, including in international law,[3] entails some measure of choice in the historical material, guided by a range of considerations, whether pedagogical, practical, intellectual or ideological.[4] Choice, when reasonably justified, is part of providing an 'accurate' historical account.

A reader examining a contemporary account of international environmental law 20, 30 or 50 years from now may be interested not only in its accuracy but also in what the account conveys of our own generational perception of our past. By then, several features will have become evident to that reader, which our generation – and some previous ones – missed or under-estimated. One feature, above all, is likely to connect our and their perception of what international environmental law had to face: the realization of a fundamental discontinuity, a fracture between scales and their understanding and an unexpected connection. Indeed, it is now becoming increasingly established that the impact of human activities on the biogeochemical cycles of the Earth System is transformational, connecting in an utterly unexpected and unprecedented manner the ephemeral scale of human history, counted in days, months, years or decades, to the vertiginous depth of geological time, which runs in the hundreds of thousands and millions of years. Humanity, through its production and consumption processes, is changing not just human history but also the very dynamics of the entire Earth System in what some see as a new geological epoch defined by humans, the

[1] See e.g. A. Boyle and C. Redgwell, *Birnie, Boyle & Redgwell's International Law and the Environment* (4th edn, 2021), at 50–57; Brown Weiss, 'The Evolution of International Environmental Law', 54 *Japanese Yearbook of International Law* (2011) 1; P.-M. Dupuy and J.E. Viñuales, *International Environmental Law* (2nd edn, 2018), at 3–26; P. Sands *et al.*, *Principles of International Environmental Law* (4th edn, 2018), at 33–51; Sand, 'Origin and History', in L. Rajamani and J. Peel (eds), *The Oxford Handbook of International Environmental Law* (2nd edn, 2021), at 50–66; Viñuales, 'The Rise and Fall of Sustainable Development', 22 *Review of European, Comparative and International Environmental Law* (*RECIEL*) (2013) 3. These narratives are echoed in widely used textbooks and treatises on international law. See, e.g., M. Shaw, *International Law* (8th edn, 2017), ch. 14; P. Gaeta, J.E. Viñuales and S. Zappalà, *Cassese's International Law* (3rd edn, 2020), ch. 20; A. Henriksen, *International Law* (4th edn, 2023), ch. 10; J. Crawford, *Brownlie's Principles of Public International Law* (9th edn, 2019), ch. 15.

[2] Report of the United Nations Conference on the Human Environment, Stockholm 5–16 June 1972, UN Doc A/CONF.48/14/Rev1 (1973).

[3] See De La Rasilla, 'The Problem of Periodization in the History of International Law', 37 *Law and History Review* (2019) 275.

[4] The distinction between these considerations – particularly between intellectual and ideological – lies mainly in the type of démarche. An intellectual inquiry is expected to be conducted in good faith, in a balanced manner, with methodological rigour accounting from sources that confirm and undermine a narrative and with the overall goal to shed light on reality. By contrast, an ideological démarche is characterized by a confirmatory bias, which deliberately distorts the sources to fit a narrative that is instrumental for a political stance. No intellectual inquiry is preserved from explicit or implicit ideological biases, but, in the practice of historiography, the two must remain distinct.

'Anthropocene'. This major fact is something 'new under the Sun', to borrow the title of John McNeill's influential environmental history of the 20th century.[5] It is and will remain with us, and the extent to which it can be addressed depends on whether we see it and integrate it into our policies.

This article argues that such is not the case with the social practice that has been specifically developed in the last half of a century to protect the global environment – namely, international environmental law[6] – and this for a very specific reason: international environmental law is built around an asymmetry between the legal organization of production and consumption processes – the 'transaction' – and the regulation of their side effects or 'negative externalities'.[7] At the core of international environmental law lies a deliberate effort to preserve legal space for the transaction – the processes that led us into the Anthropocene – while aiming to minimize its negative side effects for the environment. It is an odd mismatch, akin to a legal requirement to keep the dam gates open while at the same time requiring that the flooded areas be kept as dry as possible. In other terms, international environmental law is faced with impacts unfolding on the geological timescale, but it is structured to preserve the cause of the problem (the transaction) and focus only on the side effects (negative externalities) unfolding in human history.

The article begins with a discussion of the unprecedented confluence, particularly since the middle of the 20th century, of two incommensurable strata of time: human history and the geological timescale, as a result of human production and consumption processes of an earth-shaping scale. I refer to some key milestones in the realization of humanity's footprint on the Earth System, a revolution comparable to the discovery of deep time in the second half of the 19th century.[8] I also discuss the concepts used to diagnose the problem and its causes, particularly the energy and land use activities at the root of climate change and biodiversity loss, as two core manifestations of the Anthropocene. I then chart the permeation of this realization into the fabric of international law as a practice. The starting point of the analysis is grim as it depicts the great and persisting emphasis on crafting international legal instruments that support the production and consumption

[5] J.R. McNeill, *Something New under the Sun: An Environmental History of the Twentieth-Century World* (2000).

[6] There is now a substantial body of literature on law and the Anthropocene. I surveyed the main initial contributions in Viñuales, 'Law and the Anthropocene', C-EENRG/Collège de France Joint Working Paper 2016-4, September 2016, available at www.landecon.cam.ac.uk/sites/default/files/2023-05/wp08.pdf. The number and focus of contributions have more recently expanded, with a wide range of topics and perspectives being explored. Of note within this more recent body of literature are some edited volumes: D. French and L. Kotzé (eds), *Research Handbook on Law, Governance and Planetary Boundaries* (2021); U. Natarajan and J. Dehm (eds), *Locating Nature: Making and Unmaking International Law* (2022); P.D. Burdon and J. Martel (eds), *The Routledge Handbook of Law and the Anthropocene* (2023).

[7] On the foundations of this argument, see J.E. Viñuales, *The Organisation of the Anthropocene – In Our Hands?* (2018). A specific use of this argument to analyse energy as a legal object is provided in J.E. Viñuales, *The International Law of Energy* (2022), ch. 3.

[8] Historian Daniel Lord Smail identifies three main intellectual contributions as the pillars of this revolution in the understanding of time – namely, C. Darwin, *On the Origin of Species* (1859); C. Lyell, *The Geological Evidences of the Antiquity of Man* (1863); J. Lubbock, *Pre-Historic Times* (1865); D.L. Smail, *On Deep History and the Brain* (2008), at 26.

processes underpinning humanity's adverse footprint on environmental processes at different scales. The analysis then shows how the very foundations of international environmental law are marked by the asymmetry between the organization of production and consumption processes, on the one hand, and the environmental regulation of their negative externalities, on the other. This structural asymmetry has many faces, but it is mainly characterized by the fact that the two terms are articulated in such a way that environmental rules come into play only to minimize adverse collateral consequences without prohibiting the underlying transactions. With this articulation in mind, the final section concludes on the profound mismatch between the scale of the challenge and the practical possibilities of a body of law that is largely designed as a law of side effects. The entire analysis is presented as a diagnosis of a problem. The seriousness of the diagnosis must not be understood, however, as a display of nihilism or pure critique. A 'diagnosis' is of no use unless it serves to subsequently correct course.

2 'Something New under the Sun'

In a sonnet written in the early 19th century, the English poet William Wordsworth contrasts the villainy, to the human eye, of a lord who orders an entire forest to be cut down, with the indifference of this act from the standpoint of the course of nature, which remains unperturbed:

Degenerate Douglas! oh, the unworthy Lord!
Who mere despite of heart could so far please,
And love of havoc (for which such disease
Fame taxes him) that he could send forth word
To level with the dust a noble horde,
A brotherhood of venerable Trees,
Leaving an ancient Dome, and Towers like these,
Beggared and outraged! – Many hearts deplor'd
The fate of those old Trees; and oft with pain
The Traveller, at this day, will stop and gaze
On wrongs, which Nature scarcely seems to heed:
For shelter'd places, bosoms, nooks and bays,
And the pure mountains, and the gentle Tweed,
And the green silent pastures, yet remain.[9]

Beyond its beauty, the sonnet has the virtue of placing us directly at the heart of what, for centuries, has been a deeply rooted assumption,[10] underpinning much human thought, which has found expression not only in poetry but also in disciplines as diverse

[9] W. Wordsworth, *Poems in Two Volumes* (1807), vol. 2, at 7 (sonnet), 28, 7.

[10] The sources in this section are derived from Viñuales, 'Two Layers of Self-Regulation', 11 *Transnational Legal Theory* (2020) 16 (and the other sources referenced therein).

as geology,[11] history[12] and the nascent social sciences,[13] including economics[14] and law.[15] The assumption is that the course of nature is an immutable theatre where human history unfolds. The vicissitudes of the latter, however tragic and significant to a human eye, have little or no impact on the former.[16]

Over the 20th century, however, something fundamentally changed. 'Something new under the sun', to recall McNeill's aforementioned book, or a 'Great Acceleration', to borrow the words of Will Steffen's influential account,[17] turned human action into a force of geological proportions capable of modifying, both to its advantage and disadvantage, not merely the natural landscape but, more fundamentally, the very biogeochemical processes on which the Earth System's balance relies. The term 'environment', as it is used today, hides these distinct layers of meanings – from the landscape and natural environment evolving in human history to the vast dynamics of the Earth System. Through their combined impact, humans are modifying not just the former but also the latter, the fundamental dynamics of the 'biosphere', the term selected by Vladimir Vernadsky in a pioneering work.[18] Mapping the link between human production and consumption processes and the biogeochemical processes underpinning the self-regulation of the biosphere has enabled the development of accounts linking the profoundly different temporal strata of human history and geological time. Over the second half of the 20th century, other accounts were developed to connect these strata, such as the Gaia hypothesis introduced by James Lovelock and Lynn Margulis in 1974[19] or, at the turn of the 21st century, the concept of an 'Anthropocene' – that is, a proposed new geological epoch defined by humans as the driving force.[20] The latter has had remarkable heuristic power, leading to an active scientific and policy agenda rendered operational by the concept of 'planetary boundaries' introduced in 2009.[21] The state of such boundaries is regularly reviewed and

[11] C. Lyell, *Principles of Geology, Being an Attempt to Explain the Former Changes of the Earth's Surface, by Reference to Causes Now in Operation* (1830), vol. 1, at 164.

[12] J. Michelet, *Introduction à l'histoire universelle* (1831), at 5–7.

[13] A. Comte, *Cours de philosophie positive* (1839), vol. 4, at 251.

[14] Solow, 'Intergenerational Equity and Exhaustible Resources', 41 *Review of Economic Studies* (1974) 29, at 41.

[15] H. Kelsen, *General Theory of Law and the State* (1945), at xiv.

[16] A detailed account of this disconnect between strata, as it finds expression in the work of the most influential thinkers, is provided by P. Rossi, *I segni del tempo: storia della Terra e storia delle nazioni da Hooke a Vico* (1979).

[17] Steffen *et al.*, 'The Trajectory of the Anthropocene: The Great Acceleration', 2 *Anthropocene Review* (2015) 81.

[18] V.I. Vernadsky, Биосфера (1926), translated shortly after into French by Vernadsky and his wife – *La Biosphère* (1929) – and only much later into English as *The Biosphere* (1998).

[19] Lovelock and Margulis, 'Atmospheric Homeostasis by and for the Biosphere: The Gaia Hypothesis', 26 *Tellus* (1974) 2.

[20] Crutzen, Stoermer, 'The "Anthropocene"', 41 *IGBP Global Change Newsletter* (2000) 17; Crutzen, 'Geology of Mankind', 415 *Nature* (2002) 23. For a more recent survey, see J. Zalasiewicz *et al.* (eds), *The Anthropocene as a Geological Time Unit* (2019).

[21] Rockström *et al.*, 'A Safe Operating Space for Humanity', 461 *Nature* (2009) 472. The underlying logic is similar to the landmark Limits to Growth report of 1972. D.H. Meadows *et al.*, The Limits to Growth (1972).

updated. Studies published in 2015,[22] 2022[23] and 2023[24] have shown that several critical thresholds may have already been crossed.

What is driving this massive overuse of the Earth System is a range of production and consumption processes that are deliberately preserved and, in some cases, supported by law. The scientific accounts briefly referred to in the previous paragraphs have resulted in important and influential lines of work, and there is now a scientific consensus that human activity has planetary effects, including climate change[25] and biodiversity loss,[26] as global processes, among others. These 'processes' include anthropogenic emissions of greenhouse gases, the dominant cause of climate change, which stem primarily from energy and land use activities. Such activities consist, according to the Intergovernmental Panel on Climate Change (IPCC), in 'the burning of fossil fuels, deforestation, land use and land use changes (LULUC), livestock production, fertilization, waste management, and industrial processes'.[27] The production and consumption of fossil fuels is supported by governmental subsidies, the direct and indirect costs of which reached, in 2022, an all-time high of US $7 trillion, the equivalent of almost 7.2 per cent of the global gross domestic product (GDP).[28] The 2023 *Production Gap Report* of the United Nations Environment Programme found that the estimated increase in production 'under the government plans and projections pathways would lead to global production levels in 2030 that are 460%, 29%, and 82% higher for coal, oil, and gas, respectively, than the median 1.5°C-consistent pathways'.[29] As for the loss of biosphere integrity, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) ascribes it mainly – although not only – to land use change, understood as the conversion of land cover (clearing forests for agriculture or mining), changes in the management of an ecosystem (agricultural intensification or forest harvesting) or the spatial fragmentation of habitats.[30] Other drivers include climate change, pollution, natural resource use and exploitation and invasive alien species. A major study of the economics of biodiversity commissioned by the government of

[22] Steffen *et al*, 'Planetary Boundaries: Guiding Human Development on a Changing Planet', 347 *Science* (2015) 736.

[23] Persson *et al.*, 'Outside the Safe Operating Space of the Planetary Boundary for Novel Entities', 56 *Environmental Science and Technology* (2022) 1510; Wang-Erlandsson *et al.*, 'Towards a Green Water Planetary Boundary', 3 *Nature Reviews Earth and Environment* (2022) 380.

[24] Richardson *et al.*, 'Earth beyond Six of Nine Planetary Boundaries', 9 *Science Advances* (2023) eadh2458.

[25] Intergovernmental Panel on Climate Change (IPCC), Synthesis Report of the IPCC Sixth Assessment Report (AR6): Summary for Policymakers, March 2023, statement A.1.

[26] Pimm *et al.*, 'The Biodiversity of Species and Their Rates of Extinction, Distribution, and Protection', 344 *Science* (2014) 987.

[27] 'IPCC Glossary', *IPCC*, accessed 5 November 2025, available at https://apps.ipcc.ch/glossary/.

[28] Black *et al.*, 'IMF Fossil Fuel Subsidies Data: 2023 Update', IMF Working Paper WP/23/169 (2023).

[29] United Nations Environment Programme (UNEP), Production Gap Report 2023: Phasing Down or Phasing Up? Top Fossil Fuel Producers Plan Even More Extraction Despite Climate Promises (8 November 2023), at 4–5. The 2025 edition of this report confirmed the trend. See EI, Climate Analytics, & IISD, *The Production Gap Report 2025* (2025), at 2.

[30] See 'Models of Drivers of Biodiversity and Ecosystem Change', *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)*, accessed 5 November 2025, available at www.ipbes.net/models-drivers-biodiversity-ecosystem-change.

the United Kingdom (UK) and coordinated by Cambridge University economist Sir Partha Dasgupta estimated, based on several sources, that every year some US $500 billion of government subsidies that are potentially harmful to biodiversity are directly disbursed, which, if their broader environmental side effects are accounted for, amounts to US $4–6 trillion.[31] This estimate far exceeds the 2024 GDP estimates of countries such as India (US $3.425 trillion) or the UK (US $3.644 trillion). Both climate change and biodiversity loss, as core manifestations of human-driven global environmental change, are the result of specific 'transactions' – that is, certain production and consumption processes, particularly energy from fossil fuels and land use change.

Such global environmental change is not merely 'pollution' or 'environmental degradation'; it also amounts to interference with the biogeochemical conditions defining the main feature of our current – yet increasingly debated – geological epoch, known as the Holocene – namely, its stability.[32] These considerations may, at first, seem out of purpose in the context of an article on the development of a human practice – international environmental law – in the last half of a century. Yet, without them, it would be impossible to grasp what the problems we gather under the broad heading of 'environment' or 'environmental' actually represent. Of particular relevance, in this context, is the fact that international environmental law has failed to adjust to this profound inflexion point in the nature of the problems it aims to regulate. The scientific work described above has, of course, its own limitations. A particularly noteworthy one concerns the unification of the 'human variable', whereas in historical reality only a fraction of humanity is responsible for much of the impact, whereas the rest has suffered from the very social practices turning humans into a geological force.[33] That adds much complexity to the question of governance to the extent that redressing historical inequalities is sometimes seen as requiring more 'development', which involves the extension of the very processes that drive global environmental change. A related issue concerns the ambiguities inherent to the discourse of sustainable development, particularly when the 'development' dimension is emphasized. In a discourse oblivious to the geological proportions of human activity, the intra-generational (development) and decolonizing dimension of sustainable development are the core focus of critique. Even when the critique integrates the fundamental inconsistency between unconstrained growth and environmental limits, as in an important early contribution from Alexander Gillespie[34] or some critical accounts of the last few years,[35] the diagnosis stresses the dire implications of unsustainable development or the opposing goals pursued by

[31] P. Dasgupta, *The Economics of Biodiversity: The Dasgupta Review* (2021), at 220; P. Dasgupta, *The Economics of Biodiversity: The Dasgupta Review. Headline Messages*, (2 February 2021), at 2.

[32] See Steffen *et al.*, 'Trajectories of the Earth System in the Anthropocene', 115 *Proceedings of the National Academy of Sciences* (2018) 8252.

[33] See Viñuales, *Organisation*, supra note 7, at 32–56.

[34] A. Gillespie, *The Illusion of Progress: Unsustainable Development in International Law* (2001).

[35] See, for example, the collection of essays assembled in S.A. Atapattu, C.G. Gonzalez and S.L. Seck (eds), *The Cambridge Handbook of Environmental Justice and Sustainable Development* (2021).

different sets of norms and institutions.[36] Yet, when the vast impact of human action is brought back into the picture, development processes display their full complexity, which includes not only the legitimate intra-generational equity concerns but also the massive risks that unsustainable development poses to those individuals most vulnerable both of present and future generations.[37]

For present purposes, what matters is the contrast between international environmental law as a governance practice and its inadequacy to reflect the realization of the scale of human impact on the trajectory of the Earth System. The mismatch between international environmental law and this 'something new under the Sun' cannot be reduced to a lack of an integrative framework or to tensions between international economic law and environmental protection. Some instruments, including those specifically devoted to the protection of the ozone layer,[38] climate change[39] or biodiversity,[40] do take a planetary focus, despite their limitations. In addition, the 2030 Agenda for Sustainable Development, adopted in 2015 and including 17 Sustainable Development Goals (SDGs), was specifically negotiated as an integrative policy agenda.[41] The problem is perhaps simpler but more fundamental: international environmental law is structured

[36] There is now a vast body of literature on the tensions between international economic law (both trade and investment) and international environmental law. See, for example, the early contributions on these interfaces by E.U. Petersmann, *International and European Trade and Environmental Law after the Uruguay Round* (1995); E. Brown Weiss and J. Jackson (eds), *Reconciling Environment and Trade* (2001); E. Vranes, *Trade and the Environment. Fundamental Issues in International Law, WTO Law, and Legal Theory* (2009); J.E. Viñuales, *Foreign Investment and the Environment in International Law* (2012); K. Miles, *The Origins of International Investment Law: Empire, Environment and the Safeguarding of Capital* (2013); K. Miles (ed.), *Research Handbook on Environment and Investment Law* (2019).

[37] To limit the analysis of unequal impacts to climate change alone, the IPCC has reached the following conclusions regarding the impacts of continuing with the production and consumption of fossil fuels: 'Vulnerable communities who have historically contributed the least to current climate change are disproportionately affected (high confidence)' (IPCC, *supra* note 25, statement A.2); 'Across sectors and regions the most vulnerable people and systems are observed to be disproportionately affected' (IPCC, Climate Change 2022: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Summary for Policymakers (2022), statement B.1); 'Increasing weather and climate extreme events have exposed millions of people to acute food insecurity and reduced water security, with the largest impacts observed in many locations and/or communities in Africa, Asia, Central and South America, Small Islands and the Arctic' (IPCC, *ibid.*, statement B.1.3); 'Climate and weather extremes are increasingly driving displacement in all regions…with Small Island States disproportionately affected' (IPCC, *ibid.*, statement B.1.7); 'Flood and drought-related acute food insecurity and malnutrition have increased in Africa (high confidence) and Central and South America' (IPCC, *ibid.*, SPM, statement B.1.7).

[38] Vienna Convention for the Protection of the Ozone Layer 1985, 1513 UNTS 293; Montreal Protocol on Substances That Deplete the Ozone Layer 1987, 1522 UNTS 28.

[39] United Nations Framework Convention on Climate Change (UNFCCC) 1992, 1771 UNTS 107; Kyoto Protocol to the United Nations Convention on Climate Change 1997, 2302 UNTS 148; Paris Agreement on Climate Change 2015, 3156 UNTS 79.

[40] Convention on Biological Diversity (CBD) 1992, 1760 UNTS 79; Cartagena Protocol on Biosafety to the Convention on Biological Diversity 2000, 2226 UNTS 208; Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity 2010, 3008 UNTS 3; Nagoya – Kuala Lumpur Supplementary Protocol to the Cartagena Protocol on Biosafety 2010, 3239 UNTS 27.

[41] *Transforming Our World: The 2030 Agenda for Sustainable Development*, Doc A/Res/70/1, 25 September 2015.

in such a way as to deliberately preserve the legal space for the production and consumption processes driving global environmental change. Its focus is not on the transaction but on the transaction's 'side effects' or, to use a technical term, on the 'negative externalities' of production and consumption processes.[42] As I mentioned in the introduction, it deliberately requires or at least permits that the dam's gates be kept open, while, at the same time, attempting to keep the flooded areas as dry as possible. It is this asymmetry, at the heart of international environmental law, that needs to be brought to light and analysed in specifically legal terms.

3 International Law and Global Environmental Change

A *International Law and the Organization of Production and Consumption Processes*

Ian Brownlie's 1979 lectures at the Hague Academy on 'The Legal Status of Natural Resources in International Law' begin with a perceptive observation of particular relevance in the present context:

> In classical international law natural resources had no place. The disposition of resources was assumed to follow the delimitation of sovereignty in spatial terms between the States. Access to resources was a question managed within the legal categories of acquisition of territory, the making of agreements, the concept of the freedom of the seas, and the doctrines of intervention, so far as the last were comprehensible.[43]

This is not to say that natural resources were not sought after or important for states; only that the law underlying transactions in natural resources was unspecific in that it did not contain specific legal categories regulating them. If one looks further back into history, a similar observation can be made in relation to the international legal categories organizing another environmental turning point, namely the so-called 'triangular trade' between the British Empire, Africa and the Americas that, according to historian Kenneth Pomeranz, enabled the English Industrial Revolution.[44] Such triangular trade relied indeed on unspecific legal structures such as the freedom of the seas, the slave trade, territorial sovereignty and the conclusion of trade agreements.[45]

[42] The theory of negative externalities is rooted in the works of A.C. Pigou, *The Economics of Welfare* (1920) and Coase, 'The Problem of Social Cost', 3 *Journal of Law and Economics* (1960) 1. The basic concept concerns a failure of the market to achieve optimal welfare or 'utility' due to a negative effect of a transaction that is not priced, and it is therefore a cost borne by those who do not take part in the transaction. In a 1973 study, J.E. Meade defined an externality, positive or negative, as follows: 'An external economy (diseconomy) is an event which confers an appreciable benefit (inflicts an appreciable damage) on some person or persons who were not fully consenting parties in reaching the decision or decisions which led directly or indirectly to the event in question.' J.E. Meade, *The Theory of Economic Externalities: The Control of Environmental Pollution and Similar Social Costs* (1973).

[43] Brownlie, 'Legal Status of Natural Resources in International Law (Some Aspects)', 162 *Recueil des Cours* (*RdC*) (1979) 245, at 253.

[44] K. Pomeranz, *The Great Divergence: China, Europe and the Making of the Modern World Economy* (2000).

[45] See Viñuales, *Organisation*, *supra* note 7, at 44–45.

Following 1945, however, this situation changed. As noted by Brownlie, starting in 1952, 'a series of developments within the framework of the United Nations … focused directly on control of and access to natural resources as such'.[46] He refers to the rise of the Permanent Sovereignty movement, whereby a growing number of developing and newly independent countries relied on their majority in the United Nations General Assembly to adopt a stream of resolutions related to the use of natural resources, including the flagship 1962 Resolution 1803 (XVII) on Permanent Sovereignty over Natural Resources.[47] But he also discusses in this context the increasing resort to agreements specifically designed to exploit joint or undelimited fisheries or mineral (mostly oil) resources as well as to the emergence of concepts relating to areas beyond national jurisdiction, such as that of the common heritage of mankind. Throughout this period, capital-exporting countries also resorted to new legal techniques to protect their interests – notably, through the use of so-called 'state contracts' and, increasingly, the conclusion of bilateral investment agreements.

In the present context, the purpose of canvassing these broad trends is twofold. First, from the perspective of the prevailing legal infrastructure, one can only agree with Brownlie that international law became increasingly resource-specific after 1945 in a period that, from the standpoint of its massive environmental and resource footprint, has been characterized as a 'Great Acceleration'.[48] Whether the focus of this process was to assert the sovereign prerogatives of host states or to protect the interests of capital-exporting states and their companies, legal specification in both cases was aimed at organizing 'transactions' for natural resources to be put to use – that is, produced and consumed. In other words, the very structure of the emerging legal categories focused on the organization of the production process, without – at that point – much regard for any negative side effects. Nowhere is this asymmetry between the law organizing the transaction and that addressing its wider implications clearer than with respect to fossil fuel energy – specifically, oil.

After 1945, oil became a natural resource of increasing strategic importance prompting not only the assertion of powers over new areas, such as the continental shelf,[49] but also the exploitation of resources located abroad. In a mineral resource economy, energy resources must be extracted where they are located and then processed and shipped to areas where they are consumed. In the decolonization context, those resources were often found within the territorial or maritime boundaries of new sovereign entities. As a result, energy transactions required clarity on two main aspects. First, the specific powers of resource holders and resource seekers had to be specified not only in tradi-

[46] Brownlie, *supra* note 43, at 253.

[47] GA Res. 1803 (XVII), 14 December 1962.

[48] See Steffen *et al.*, *supra* note 17.

[49] 'Policy of the United States with Respect to the Natural Resources of the Subsoil and Sea Bed of the Continental Shelf', Presidential Proclamation no. 2667, 28 September 1945, reprinted in 327 *Department of State Bulletin* (1945) 485. The initiative for this proclamation was directly related to the possibility of drilling for oil offshore. See Watt, 'First Steps in the Enclosure of the Oceans: The Origins of Truman's Proclamation on the Resources of the Continental Shelf, 28 September 1945', 3 *Marine Policy* (1979) 211, at 213.

tional territorial terms but also in newly claimed maritime spaces and, more generally, in terms of national prerogatives to set energy policy. Second, in addition to powers, the energy transaction itself – that is, investment to extract the resource abroad and then regulation of trade and transit to send it to the points of consumption – had to be organized.[50] These two aspects were addressed with different levels of granularity in post-1945 international law. Some specific instruments such as joint development agreements for the exploitation of shared or contested natural resources were developed.[51] But much remained governed by unspecific rules conferring powers over maritime spaces and regulating activities such as foreign investment, trade and transit. In both the specific and the general law applicable to energy transactions, consideration of potentially adverse side effects was conspicuously absent or narrowly confined to certain exceptions – most notably, Article XX of the General Agreement on Tariffs and Trade (GATT).[52] After the 1972 Stockholm Conference, when environmental protection started to consolidate as a matter of international cooperation, the law organizing the transactions was not reformulated. It kept essentially the same structure and focus, with only an additional layer of international law now addressing some specific side effects of energy transactions, such as the dumping in the ocean of radioactive waste,[53] operational and accidental discharges from oil tankers[54] and a range of other instruments.

The post-1990 political context offers an even clearer picture of how the organization of international energy transactions became increasingly specific while keeping the asymmetry between 'transactions' and 'externalities'. The fall of the symbol of Cold War politics in Europe – the Berlin Wall – on 9 November 1989 raised not only much hope, but also uncertainty, on the future relations between East and West. Some months later, in May 1990, Ruud Lubbers, then prime minister of The Netherlands, met with Dr Subroto, secretary-general of the Organization of Petroleum Exporting Countries (OPEC), to discuss the issue of oil supply.[55] The perception, in Lubbers' recollection, was that OPEC's role in supplying oil was bound to grow but that satisfying global demand

[50] I have discussed in detail how this process found expression in international law in Viñuales, *Organisation*, *supra* note 7, particularly chapters 1 and 2. The discussion in this section of the article follows the broader treatment of the topic in this monograph.

[51] The first offshore joint development agreement was signed in 1958 between Bahrain and Saudi Arabia (see Bahrain-Saudi Arabia Frontier Agreement, 22 February 1958, 1733 UNTS 3). On this practice, see among many others Ong, 'Joint Development of Common Offshore Oil and Gas Deposits: "Mere" State Practice or Customary International Law?', 93 *American Journal of International Law* (1999) 771; V. Becker-Weinberg, *Joint Development of Hydrocarbon Deposits in the Law of the Sea* (2014).

[52] General Agreement on Tariffs and Trade 1947, 64 UNTS 187.

[53] Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 29 December 1972, 1046 UNTS 138. See generally Viñuales, *International Law*, *supra* note 7, ch. 3.

[54] International Convention on Civil Liability for Oil Pollution Damage 1969, 973 UNTS 3; International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage 1971, 1110 UNTS 58; International Convention for the Prevention of Pollution from Ships 1973, amended by the Protocol of 17 February 1978, 1340 UNTS 184.

[55] See Lubbers, 'Foreword', in T.W. Wälde (ed.), *The Energy Charter Treaty: An East-West Gateway for Investment and Trade* (1996) xii, at xiii–xvii.

also required additional massive investment. Security of supply was of particular concern for the European Community, given that Western European countries had become major importers of 'red' oil and gas since the 1970s.[56] During the following month, in the run-up to the European Council of late June 1990, Lubbers combined in his mind the issue of energy security with the uncertain future of the communist bloc in a memorandum entitled 'European Energy Community' of 25 June 1990, which he shared with fellow European leaders.[57] The gist of the document was to stabilize energy exchanges between European countries (as consumers) and countries of the (soon former) Soviet bloc (as producers). The initiative was entrusted to the European Commission, and it led, first, to the adoption of a non-binding instrument – the European Energy Charter – on 17 December 1991[58] and, later, to the negotiation and adoption of the Energy Charter Treaty (ECT) on 17 December 1994.[59] The grand bargain underpinning the ECT system was precisely to organize energy transactions – specifically, investment, trade and transit – between consumer and producer countries. The latter needed investment to develop their resources and access to European markets to sell them ('security of demand'), whereas the former pursued 'security of supply' and investment opportunities. As one commentator put it, the ECT can be pinned down to the formula 'access to markets for access to resources'.[60]

Seen from the perspective of the organization of the 'transaction', the ECT is remarkable for its comprehensive and specific focus on enabling and protecting investment, trade and transit in energy, while reserving the question of 'sovereignty' over the resources themselves and confining environmental protection essentially to the 'efficiency' of operations rather than to rules potentially interfering with the underlying transaction. When, in 1996, Lubbers pondered on the issues that motivated the process leading to the ECT, environmental protection was certainly one of them but, clearly, not an overriding one. According to him,

> environmental problems associated with the energy supply, such as acid deposition and the enhanced greenhouse effect, extend beyond national boundaries and even continental boundaries. Above all after the Brundtland Report, the European Council was becoming increasingly conscious of the scale of the environmental problem. The Council was aware of the important role technology could play here.[61]

The use of technology would reduce negative environmental externalities by making the transaction more efficient or, in other words, without interfering with the organization of the transaction itself. This is still the contemporary view of the ECT – as a 'unique treaty in that it covers all forms of international co-operation in the energy

[56] See Perović and Krempin, 'The Key Is in Our Hands: Soviet Energy Strategy during Détente and the Global Oil Crises of the 1970s', 39 *Historical Social Research* (2014) 113.

[57] Referred to in Lubbers, *Foreword*, *supra* note 55. On the negotiation of the Energy Charter Treaty, see K. Hobér, *The Energy Charter Treaty: A Commentary* (2020), at 13–24.

[58] Concluding Document of the Hague Conference on the European Energy Charter, 17 December 1991.

[59] Energy Charter Treaty (ECT) 1994, 2080 UNTS 100.

[60] A.A. Fatouros, 'An International Legal Framework for Energy', 332 *RdC* (2007) 355, at 412.

[61] Lubbers, *supra* note 55, at xiv.

sector in one multilateral document: investment, trade, transit *and energy efficiency*',[62] which can partly explain the recent backlash from some constituencies against the instrument and the efforts towards its 'modernization'.[63]

The asymmetry between the legal organization of the transaction and that of the externality was enshrined in Article 19 of the ECT, entitled 'Environmental Aspects'. The overall purpose of this provision was to 'minimize' the harmful 'Environmental Impact', understood broadly as encompassing environmental protection, human health and also cultural expressions.[64] The drafting of the provision made clear, however, that such considerations were not to 'interfere' with energy transactions. The overall obligation, stated in the chapeau of Article 19(1), was formulated as follows: '[E]ach Contracting Party shall strive to *minimise* in an *economically efficient* manner harmful Environmental Impacts occurring either within or outside its Area from all operations within the Energy Cycle in its Area, taking proper account of safety. In doing so each Contracting Party shall act in a *Cost-Effective manner*.'[65]

The provision then recalls the precautionary and polluter-pays principles and adds, echoing Principle 16 of the 1992 Rio Declaration on Environment and Development,[66] that action to internalize the cost of negative externalities must not 'distor[t] Investment in the Energy Cycle or international trade'. The priority of the organization of the transaction over measures to tackle negative externalities was further ingrained in several provisions. The definition of the 'Energy Cycle' in Article 19(3)(a) referred to 'minimizing harmful Environmental Impacts' of an otherwise undisturbed 'energy chain'. The characterization of 'Improving Energy Efficiency' in Article 19(3)(c) emphasized the need to maintain 'the same unit of output (or a good or service) without reducing the quality or performance of the output'. In an understanding regarding Article 19(1)(i), which concerned the assessment of environmental impacts, it was expressly stated that '[i]t is for each Contracting Party to decide the extent to which the assessment and monitoring of Environmental Impacts should be subject to legal requirements'. The Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA), which was adopted to flesh out this provision, maintained the asymmetry in no uncertain terms.[67] Article 13(1) of the PEEREA provided, indeed, that '[i]n the event of inconsistency between the provisions of this Protocol and the provisions of the Energy Charter Treaty, the provisions of the Energy Charter Treaty shall, to the extent of the inconsistency, prevail'.

[62] Hobér, *supra* note 57, at 13 (emphasis added).

[63] On this process, see, e.g., Verbeek, 'The Modernization of the Energy Charter Treaty: Fulfilled or Broken Promises?', 8 *Business and Human Rights Journal* (2023) 97; Daszko, 'The Energy Charter Treaty at a Critical Juncture: of Knowns, Unknowns, and Lasting Significance', 26 *Journal of International Economic Law* (2023) 720.

[64] ECT, *supra* note 59, Art. 19(3)(b); Briercliffe, Latasz, 'Yesterday, Today and Tomorrow? The ECT and Its Modernization' (2025) 40 *ICSID Review* https://doi.org/10.1093/icsidreview/siaf012.

[65] *Ibid.*, Art. 19(1) (emphasis added).

[66] Rio Declaration on Environment and Development 1992, 31 ILM 874 (1992), Annex.

[67] Protocol on Energy Efficiency and Related Environmental Aspects 1994, 2081 UNTS 3.

In the last decade, the ECT has come under increasing criticism for its implications for the energy transition. Significant efforts have been made to globalize the ECT, including the adoption in 2015 of a political instrument – the International Energy Charter[68] – as well as to 'modernize' it. ECT 'modernization' is an expression describing a process towards the amendment of the ECT that was initiated in 2017, formally mandated in 2019 and effectively conducted between 2020 and June 2022, when an agreement in principle was reached.[69] It is not my purpose to comment on current developments, but the reference to the modernization process, which was in part driven by a perceived need to align the ECT with climate policy, provides a glimpse into the normative struggle unfolding within the asymmetry between the legal organization of 'transactions' and that of environmental 'externalities'. As discussed next, the asymmetry was and remains deeply ingrained in the structure of international environmental law as it emerged in the 1970s and consolidated in the 1990s. Yet, in the last two decades, the increasing realization of the enormity of the challenge has placed the struggle unfolding at the heart of the asymmetry in a different light.

B *International Law and the Transaction's Side Effects*

From the other shore of asymmetry – that is, that of the regulation of the transaction's negative externalities – international law started to address environmental degradation with increasing specificity in the late 1960s and the early 1970s. Treaty practice addressing issues that could, in hindsight, be deemed environmental started much earlier – in the late 1800s and early 1900s – but it would be utterly anachronistic to consider such treaties as early manifestations of international environmental law. By contrast, the 1972 Stockholm Conference was a genuinely important moment, despite the absence of the Soviet bloc and the emergence of North-South tensions. The struggle at the heart of the asymmetry was shaped by the Stockholm Conference in a structural, indeed foundational, way. It set a foundation for the rules and instruments that, over the years, would become the field of international environmental law, ingraining the asymmetry in its very 'DNA'. In order to investigate this underlying structure, rather than repeating the broad trends delineated in prevailing narratives,[70] it may be useful to follow the same approach as in the previous section. I will do so by, first, conducting an inroad into one foundational choice made at the Stockholm Conference – namely, framing environmental protection as an essentially anthropocentric matter. I will then turn to a more recent context to assess not only continuity but also new departures in the struggle within the asymmetry.

The term 'anthropocentrism', as used in a legal context, is an unnuanced expression emphasizing that nature is to be protected for the interest of humankind only or mainly.

[68] Concluding Document of the Ministerial ('The Hague II') Conference on the International Energy Charter, 21 May 2015.

[69] Public Communication Explaining the Main Changes Contained in the Agreement in Principle (Ad Hoc Meeting of the Energy Charter Conference), 24 June 2022, available at www.energychartertreaty.org/modernisation-of-the-treaty/.

[70] See the works referred to in *supra* note 1.

Even instruments that appear to focus on the protection of the environment for its own sake, such as Articles 35(3) and 55(1) of Additional Protocol I to the Geneva Conventions, in fact allow a large margin of manoeuvre to the waging of warfare, with the environment only protected *in extremis* (against 'widespread, long-term and severe damage') or instrumentally (to the extent that 'damage to the natural environment' may 'prejudice the health or survival of the population').[71] As for the Convention for the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, although it banned environmental modification techniques, it did so – according to its Article 1(1) – to avoid their use as 'means of destruction, damage or injury to any other State Party'.[72] Adding nuance to the historical relevance of this anthropocentric focus is a difficult exercise that entails making sense of several layers of discursive sedimentation. I will begin by stating what I understand to be the historical choice made at Stockholm and then situate it in the broader intellectual horizon discussed in section 2 of this article. The historical choice was to protect the 'environment' for the benefit of humankind, present and future, rather than for its own sake. The assumption was that humankind was engaged in a struggle against nature, pushing back natural constraints for its own progress, including science, technology and natural resource use. The protection of the environment was therefore a matter of reducing the negative side effects of this much-needed struggle, with the assumption that the course of nature itself would remain unperturbed. This framing pervades the text of the most emblematic instrument adopted at the 1972 Stockholm Conference, the Stockholm Declaration.[73]

The process leading to the Stockholm Declaration was long, convoluted and mired in controversy. An intergovernmental preparatory committee was established, which in turn set up a working group to prepare a draft declaration (Working Group 1). The draft of this working group was forwarded to the conference itself, which established another working group (Working Group 2). The latter substantially revised the initial draft leading to the text eventually adopted at Stockholm. The very first paragraph of the declaration's preamble contains, in a condensed form, its intellectual horizon and, indeed, that of the emerging field of international environmental law. It states:

> Man is both creature and moulder of his environment, which gives him physical sustenance and affords him the opportunity for intellectual, moral, social and spiritual growth. In the long and tortuous evolution of the human race on this planet a stage has been reached when, through

[71] Additional Protocol I to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I) 1977, 1125 UNTS 3.

[72] See Convention for the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques 1976, 1108 UNTS 151, Art. 1(1).

[73] Stockholm Declaration on the Human Environment 1972, 11 ILM 1416 (1972). As noted by Maurice Strong, who served as secretary-general of the Stockholm Conference, when introducing the discussion of this text to the Second Committee of the UN General Assembly, the declaration was 'the first acknowledgement by the community of nations of new principles of behaviour and responsibility which must govern their relationship in the environmental era'. Statement by Maurice F. Strong before the Second Committee of the General Assembly, 19 October 1972, at 2–3 (mimeo), reproduced in Sohn, 'The Stockholm Declaration on the Human Environment', 14 *Harvard International Law Journal* (1973) 423, at 432.

> the rapid acceleration of science and technology, man has acquired the power to transform his environment in countless ways and on an unprecedented scale. Both aspects of man's environment, the natural and the man-made, are essential to his well-being and to the enjoyment of basic human rights – even the right to life itself.

This formulation emerged from four core ideas that had been retained in the draft of Working Group 1:[74]

> Man is the nucleus of all efforts to preserve and enhance the environment; Man's life is affected by his environment which in turn is affected by his activities; The maintenance of a safe, healthy and wholesome environment is indispensable to man's well-being and to the full enjoyment of his basic human rights, including the right to life itself; Serious impairment of the environment is being caused by man's activities, in particular by uncontrolled use of technology, by lack of rational planning of the use of the earth's resources, and by increased urbanization.[75]

The first core idea leaves no doubt as to the anthropocentric horizon of 'all efforts to preserve and enhance the environment'. Importantly, however, the second and fourth core ideas have a deeper resonance, which recalls the origins of the initiative to adopt a declaration in an earlier conference, of a scientific nature, convened by the United Nations Educational, Scientific and Cultural Organization in 1968.[76]

The intellectual horizon of this other conference was much closer to the emerging scientific understanding of a link between human-driven environmental degradation and the earth's biogeochemical cycles (see section 2). The core preambular ideas retained by Working Group 1 reflected such understanding. Yet, in the final text of the Stockholm Declaration, the wording of the opening paragraph was redrafted to praise the progress in the struggle against nature ('[i]n the long and tortuous evolution of the human race on this planet a stage has been reached when, through the rapid acceleration of science and technology, man has acquired the power to transform his environment in countless ways and on an unprecedented scale'). As noted by Louis Sohn in a somewhat demeaning tone, it was reformulated:

> to provide at the very beginning a counterpoise to the cries of some young environmentalists who have blamed science and technology for our present predicament. The draftsmen put instead in the forefront the notion that without science and technology man would not have been able to master the environment and, as pointed out in the final sentence, might have even forfeited his life in the struggle against cruel nature.[77]

Despite a reference to humankind's destructive powers in paragraph 3 of the preamble, the narrative underlying the declaration remained altogether one of progress with some environmental safeguards or, in other words, of asymmetry. Significantly, the need for

[74] Sohn mentions only three of them, but the fourth is directly relevant.

[75] Report of the Intergovernmental Working Group on the Declaration on the Human Environment, Doc A/CONF.48/PC.12, 14 June 1971, Annex I.

[76] The Inter-governmental Conference of Experts on the Scientific Basis for Rational Use and Conservation of the Resources of the Biosphere. See Sohn, *supra* note 73, at 425.

[77] Sohn, *supra* note 73, at 439.

the safeguards themselves was nuanced, with a distinction made between developed and developing countries. For the latter, paragraph 4 noted that 'most of the environmental problems [were] caused by underdevelopment', and paragraph 5 added, in a rebuke to the influential *Limits to Growth* report published in March 1972,[78] that '[i]t is the people that propel social progress, create social wealth, develop science and technology and, through their hard work, continuously transform the human environment. Along with social progress and the advance of production, science and technology, the capability of man to improve the environment increases with each passing day'. Growth and development were not in question.

The connection with the intellectual horizon discussed in section 2 of this article is limpid. One can recall some of the sources referred to earlier. Auguste Comte, the founder of positivism in social science, noted, for example, that '[t]he local physical causes, very powerful at the origins of civilization, have progressively lost their grip as the natural course of human development increasingly allows to neutralize their action'.[79] In the same vein, 19th-century French historian Jules Michelet described history in the following terms:

> Since the beginning of the world a war started that will only end with the end of the world, not before; the war of man against nature, of spirit against matter, of freedom against fatality. History is nothing but the narrative of this everlasting fight. … What must encourage us in this fight without end, is the fact that, overall, one of the terms does not change, and the other does change and becomes stronger. Nature remains the same, whereas every day man takes some advantage over it.[80]

Closer to us, Robert Solow, whose work on the theory of economic growth became very influential in the second half of the 20th century, also considered the human strata as being entirely capable of detaching itself from the possible degradation of the natural strata. In a 1974 piece concerning the use by present generations of exhaustible natural resources, he noted indeed that 'earlier generations are entitled to draw down the pool [of exhaustible resources] (optimally, of course!) so long as they add (optimally, of course) to the stock of reproducible capital'.[81]

In the post-1990 world, the anthropocentric course embarked at Stockholm consolidated. At the same time, the implications of human action for the biospheric balance were by then clearer and some (limited) new departures can be discerned in how international law gave expression to them. I will discuss both the continuity and the change, before explaining, in a concluding assessment, why the asymmetry between the transaction and the externality remains the most fundamental limitation for international environmental law, as a technology, to rise to the challenges of the 2020–2030 critical decade. In the run-up to the 1992 Earth Summit, a major goal was the negotiation of a declaration that would encapsulate the principles defining cooperation in relation to

[78] Meadows *et al.*, *supra* note 21.
[79] Comte, *supra* note 13, at 251 (my translation).
[80] Michelet, *supra* note 12, at 5–7 (my translation).
[81] Solow, *supra* note 14, at 41.

the emerging concept of sustainable development. The Rio Summit unfolded in a post-Cold War context. The main fault-line running through it was the North-South divide, which found expression in the mainstreaming of sustainable development as the overarching concept driving negotiations rather than a focus on environmental protection. As for the Stockholm Declaration, the first point to be noted is the profoundly emblematic nature of the Rio Declaration, which remains the main statement of most – but not all – principles of international environmental law.[82] For present purposes, four aspects of the Rio Declaration are noteworthy. Three of them indicate continuity with the Stockholm anthropocentric framing, whereas one provides a measured indication of new departures. Such new departures find further – yet nuanced – support in a fifth aspect of the Rio moment – namely, the focus of certain treaties adopted around this period.

The first three aspects all point to a consolidation of Stockholm anthropocentrism, with an increasing emphasis on promoting economic and social development and, importantly, an almost total neglect of a dimension present – although played down – at Stockholm – namely, the potential for human action to disrupt the biospheric balance. First, the preamble of the Rio Declaration is brief, but the focus on anthropocentrism is stated in strong and unambiguous terms in Principle 1: 'Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.' When compared to Principle 1 of the Stockholm Declaration, the term 'environment' has been replaced with that of 'sustainable development', and the emphasis is on 'entitle[ments]' rather than on both rights and responsibilities, as in Stockholm.[83] The text was adopted in the version agreed in the last session of the preparatory committee, which was based on a draft prepared by the G77.[84] The focus on developmental considerations is therefore unsurprising. These same considerations pervade the entire declaration, but a second aspect is particularly noteworthy.

During the negotiations of what became Principle 2 of the Rio Declaration, proposals to substantially revise the formulation of this 'Stockholm Principle' were soon put to rest, except for one.[85] A close analysis of this principle is important due to its centrality for the entire field of international environmental law and its foundational character.[86] In its Stockholm version, Principle 21 stated that 'States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not

[82] Rio Declaration, *supra* note 66; see J.E. Viñuales (ed.), *The Rio Declaration on Environment and Development: A Commentary* (2015).

[83] See Francioni, 'Principle 1: Human Beings and the Environment', in Viñuales, *supra* note 81, 93, at 94–95.

[84] Rio de Janeiro Charter/Declaration on Environment and Development, UN Doc A/CONF.151/PC/WG.III/L.20/Rev.1, 19 March 1992. This centrality has recently been confirmed by the International Court of Justice in *Obligations of States in respect of climate change*, advisory opinion (23 July 2025), paras. 132–139, 272–300, 409, 439.

[85] See Duvic Paoli and Viñuales, 'Principle 2: Prevention', in Viñuales, *supra* note 81, 107, at 111–113.

[86] See Duvic Paoli and Viñuales, 'Prevention of Environmental Harm', in J.E. Viñuales (ed.), *The UN Friendly Relations Declaration at 50: An Assessment of the Fundamental Principles of International Law* (2020) 283.

cause damage to the environment of other States or of areas beyond the limits of national jurisdiction'. Already in this version, the principle of prevention begins with a legal emphasis on preserving the transaction – 'the sovereign right to exploit their own resources' – and only then moves to the environmental safeguards – 'the responsibility to ensure'. At Stockholm, the transaction had been somewhat limited by the addition of 'pursuant to their own environmental policies'. Such policies were domestically decided, but even a self-imposed environmental safeguard is a safeguard. At Rio, the only amendment of the Stockholm Declaration that made it through was the loosening of this safeguard, by formulating the text of Principle 2 of the Rio Declaration in such a way that it asserted 'the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies'. Such a change in the wording of a principle that, unlike other principles in the Declaration, already benefited from a settled and widely accepted formulation was perceived as an indicator that the field was moving away from the ecological (but anthropocentric) focus of Stockholm and into a new body of law on sustainable development.[87]

The third aspect, noted earlier, is the absence of any reference to the potential of human action to disrupt the biospheric balance. This is all the more remarkable since, by the time the Earth Summit was convened, three major multilateral regimes had been negotiated in relation to genuinely global environmental change – namely, two conventions on ozone depletion[88] and two of the so-called 'Rio Conventions': the United Nations Framework Convention on Climate Change (UNFCCC)[89] and the Convention on Biological Diversity (CBD).[90] A third 'Rio Convention' was adopted in 1994 in the relation to another manifestation of global environmental change – namely, desertification.[91]

A fourth aspect of the Rio Declaration signals, however, a different direction. The declaration reasserted the need to protect future generations (Principle 3) and introduced the first global formulation of the precautionary approach (Principle 15). Regarding intergenerational equity, the negotiation history of Principle 3 shows that, initially, this principle was intended to assert quite the opposite logic – that is, a 'right to development'.[92]

[87] See the contemporaneous study by Sands, 'International Law in the Field of Sustainable Development', 65 *British Yearbook of International Law* (1994) 303, at 322 (noting that 'most commentators have taken the view that the Declaration reflects the dominant perspective that human developmental needs are paramount'). Of the wording change in the prevention principle, the late Marc Pallemaerts saw it as a 'skillfully masked step backwards', which had the effect of 'upset[ting] the balance struck in Stockholm between the sovereign use of natural resources and the duty of care for the environment'. Pallemaerts, 'International Environmental Law from Stockholm to Rio: Back to the Future', 1 *RECIEL* (1992) 254, at 256. Sands himself gives less importance to the change, but only because he considers that the right to exploit natural resources for development was already universally accepted. See Sands, *ibid.*, at 343.

[88] Vienna Convention, *supra* note 38; Montreal Protocol, *supra* note 38.

[89] UNFCCC, *supra* note 39.

[90] CBD, *supra* note 40.

[91] United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa 1994, 1954 UNTS 3.

[92] See Molinari, 'Principle 3: From a Right to Development to Intergenerational Equity', in Viñuales, *supra* note 81, 139.

A reference to the needs of present and future generations was added as an environmental safeguard against the negative side effects arising from the exercise of such a right.[93] Over time, however, the centre of gravity in the understanding of the principle shifted to the intergenerational equity element. As for the precautionary approach,[94] it was intended to embody a cautious attitude towards the consequences of human action, in a logic akin to the 'principle of responsibility' expounded by German philosopher Hans Jonas.[95] Yet, even in this context, the formulation of the precautionary approach was highly nuanced to protect development and to ensure that action remains within the bounds of what efficiency considerations allow rather than interfering with the underlying transaction: 'In order to protect the environment, the precautionary approach shall be widely applied by States *according to their capabilities*. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing *cost-effective measures* to prevent environmental degradation.'[96]

Intergenerational equity and precaution are core ideas in shaping how international law could face the geological scale of humanity's environmental footprint. Their formulation in the Rio Declaration gave expression to deeper intellectual currents, but their promise as effective regulative instruments has so far struggled to materialize. Such a conclusion would require a type of long substantiation that can hardly be accommodated in the confines of this article, but the essence of it is that intergenerational equity still lacks institutionalization and actionability, whereas precaution has somewhat fallen victim to an excess of enthusiasm, blurring its definition and requirements. Both remain crucial, however, if they can be rid of the asymmetry coded in their language. In other words, both principles need to move beyond being tools for fine-tuning the negative externalities of a transaction; they need to become a basis to prioritize environmental protection over the transaction.

The fifth aspect to be noted concerns the normative development that unfolded from the late 1980s onwards and, above all, the adoption of treaty regimes on problems arising from global environmental change – namely, ozone depletion, climate change, biodiversity loss and desertification. Unlike other previous or subsequent treaties, these regimes provided a framework to address problems on a planetary scale. The recognition, in legal form, of the sheer scale of the problem was linked to the establishment of science-policy interfaces (SPIs) to guide negotiations and implementation. The two most prominent SPIs are the IPCC, established in 1988, and IPBES, established in 2012. The policy-relevant knowledge basis provided by the IPCC's assessment and special reports and by IPBES's global assessments have been influential in the development of their

[93] On the foundations of this principle, see E. Brown Weiss, *In Fairness to Future Generations: International Law, Common Patrimony and Intergenerational Equity* (1989).

[94] See Cançado Trindade, 'Principle 15: Precaution', in Viñuales, *supra* note 81, 403. On the foundations of the precautionary principle, see A. Trouwborst, *Evolution and Status of the Precautionary Principle in International Law* (2002).

[95] H. Jonas, *In Search of an Ethics for the Technological Age* (1984); the translation by Hans Jonas and David Herr of Jonas' book originally published in German is *Das Prinzip Verantwortung. Versuch einer Ethik fu¨r die technologische Zivilisation* (1979).

[96] Rio Declaration, *supra* note 66, Principle 15 (emphasis added).

respective policy pillars. The negotiation of the Paris Agreement under the UNFCCC was specifically paced to allow for the publication of the IPCC's fifth assessment report,[97] and IPBES's global assessment report was timed to influence the negotiation of the post-2020 Global Biodiversity Framework under the CBD.

A closer look at these instruments would reveal, however, that the asymmetry between transactions and externalities was ingrained in their very text. For example, Article 3 of the UNFCCC, which states the overarching principles of the climate change regime, includes alongside intergenerational equity and precaution also a reference to the primacy of the transaction, which echoes the language of Article XX of the GATT:

> The Parties should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them to better address the problems of climate change. *Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade* (emphasis added).

Such primacy is increasingly at odds with the urgency conveyed by the evolving scientific understanding of climate change, and it was given effect – on different grounds – in a trade dispute concerning the low-carbon transition of the world's third-highest emitter.[98] At the 28th Conference of the Parties (COP-28) of the UNFCCC, held in Dubai in late 2023, the tensions between the terms of the asymmetry became manifest in the negotiation of a carefully worded reference to 'the need for deep, rapid and sustained reductions in greenhouse gas emissions' and, more specifically, to '[t]ransitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science'.[99] Yet no further action on this issue was taken at COP-29, which was held in another fossil fuel-producing country, Azerbaijan. Five years into the 2020–2030 critical decade, international environmental law, even in its most sophisticated forms, would seem to remain a mere law of side effects.

If a counter-example to disprove the asymmetry could be provided, one would expect to find it in the proposed formulation of the ultimate crime against the environment – the crime of 'ecocide'. If an action reaches such an exceptional threshold of seriousness, it could indeed be expected that the balancing between the protection of the transaction and the protection of the environment would be finally suspended and that this crime would operate as an absolute bar to extreme levels of environmental harm. However, as discussed in the final section of this article, even in this context, the asymmetry has been preserved, in yet another indication that it is a structural feature.

[97] Paris Agreement, *supra* note 39 Annex.

[98] WTO, *India – Certain Measures Relating to Solar Cells and Solar Modules – Report of the Appellate Body*, 16 September 2016, WT/DS456/AB/R, WT/DS456/AB/R/Add.1.

[99] Decision _/CMA.5, Outcome of the First Global Stocktake, 13 December 2023, para. 28(d).

4 A Mere Law of Side Effects?

Over the years, when presenting the standard narrative of the evolution of global environmental governance, I have argued that sustainable development was turning 'brownish'[100] or, in other words, that social and economic development had kept the upper hand over environmental protection as the focus moved from normative development to actual implementation. This is still the case in the middle of the 2020–2030 critical decade, when war in Ukraine and the Middle East, recessionary trends in Europe, an emboldened new administration in the USA, the rise of AI based on energy-intensive data centres and growing geopolitical competition have provided yet another opportunity to prioritize the very transactions that drive global environmental change. In this article, I have tried to show that this tendency is not accidental but structural. International environmental law is structured in such a way that the asymmetry between the organization of transactions and the regulation of externalities is foundational. This is not a reference to the well-known enforcement deficiencies of international law as a whole. It is a specific structural feature of international environmental law, which reflects a wider asymmetry in international law as a whole. Even at a moment in history when the unfathomable depth of geological time comes into contact with ephemeral political history and when human action is so massively affecting the biospheric balance, one key technology to rise to the challenge – international environmental law – remains trapped in this structural asymmetry.

To illustrate the continuing operation of this asymmetry to this very day, I will end this article with an inroad into a legal development of particular significance. One major trend of the post-1990 context was the internationalization of criminal prosecution, both with respect to specific contexts (such as the war in the former Yugoslavia and the genocide in Rwanda) and in general, with the work of the International Law Commission leading to the adoption in 1998 of the Rome Statute of the International Criminal Court.[101] Yet the environmental dimension was left outside this important trend, leading to civil society efforts to have the concept of 'ecocide' criminalized at the international level and integrated into the Rome Statute. A difficult but necessary step in this process was to develop a specific definition of the crime of 'ecocide'. In June 2021, an Independent Expert Panel convened by the UK's Charity Stop Ecocide Foundation published a proposed definition of 'ecocide' intended for inclusion – through an amendment – in the Rome Statute.[102] The panel was an essentially academic initiative, although its work involved frequent consultations with policy-makers. In the panel's outcome report, the crime of 'ecocide' was defined in draft Article 8 *ter*, paragraph 1, as 'unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and either widespread or long-term damage to the environment being caused by those acts'. The definition of this crime – both the one proposed by the panel and, indeed, any definition of an international crime of ecocide – must serve many purposes. One purpose is to

[100] See Viñuales, *supra* note 1.

[101] Rome Statute of the International Criminal Court 1998, 2187 UNTS 3.

[102] Independent Expert Panel for the Legal Definition of Ecocide, Commentary and Core Text, June 2021.

signal an absolute limit, which, although extremely demanding, would send a strong signal of where the red line is, much like the prohibition enshrined in Article 35(3) of Additional Protocol I to the Geneva Conventions.[103] Although the criminalized conduct may only encompass a narrow category of acts, the narrowness is counterbalanced by the fact that such acts would be criminal under any circumstances or, in other words, that such acts could be justified by their socio-economic benefits.

Given this signalling function, one would expect the environmental protection term of the asymmetry to prevail, at least in this extremely narrow context, over the protection of the transaction. Yet the formulation betrays the continued operation of the asymmetry at the heart of this crime. This is for two main reasons. First, the formulation refers to 'unlawful or wanton acts', implying that only part of the acts that are constitutive of ecocide are unlawful. Other acts would therefore be, in the present state of international law, lawful except when they are 'wanton' and meet the other conditions to be an ecocide. If we stopped here, the criminalization of acts that are otherwise lawful under international law would, indeed, set the expected red line. However, and this is the second reason, the 'wanton' threshold itself is built around the asymmetry. Indeed, according to Article 8 *ter*, paragraph 2(a), 'wanton' means 'with reckless disregard for damage *which would be clearly excessive in relation to the social and economic benefits anticipated*' (emphasis added). In other words, if the social and economic benefits anticipated are substantial enough, destruction of the environment, however severe, widespread and long term, would not be criminal. If the logic is extended to a different context, the murder of an innocent or the genocide of a people would remain justifiable on socio-economic grounds. The commentary to the proposal confirms this nuance: 'This additional threshold draws upon environmental law principles, *which balance social and economic benefits with environmental harms through the concept of sustainable development*.'[104] From a legal standpoint, this observation is broadly accurate, and this is precisely the issue. The asymmetry between the legal organization of the transaction and that of its side effects remains coded in the very DNA of international environmental law to this very day, even when a definition of the ultimate crime against the environment is attempted.

When decades from now, a reader may inquire why, faced with a wealth of scientific information about the need to avoid crossing critical thresholds, international law was powerless to drive genuine change, the answer will lie in part in the

[103] Additional Protocol I, *supra* note 71. Article 35(3) states: 'It is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment.' This provision has been deemed to set a threshold that is so demanding that its scope of practical operation is very limited. See, e.g., UNEP, *Protecting the Environment during Armed Conflict: An Inventory and Analysis of International Law* (Nairobi: UNEP, 2009), at 11; International Committee of the Red Cross, Guidelines on the Protection of the Natural Environment in Armed Conflict, September 2020, Rule 2, para. 49 (characterizing this rule as stating an absolute prohibition: 'Even in cases where objects forming part of the natural environment could otherwise be targeted lawfully as military objectives, or could otherwise incur damage arising from a lawful application of the principle of proportionality, this rule establishes an "absolute ceiling of permissible destruction" that prohibits all widespread, long-term and severe damage to the natural environment regardless of considerations of military necessity or proportionality' (referring to the United States Army, Operational Law Handbook (2015) at 333)).

[104] Independent Expert Panel for the Legal Definition of Ecocide, *supra* note 1, at 7 (emphasis added).

general implementation shortcomings of international law. However, for international environmental law, the answer will not be complete if it fails to account for the fact that our legal technology – even when it is effectively implemented – remains trapped in an asymmetry giving priority to the source of the problem rather than to its solution.